



THE
NORTH ATLANTIC TELEGRAPH,
VIA
THE FARÖE ISLES, ICELAND, AND GREENLAND.

MISCELLANEOUS
REPORTS, SPEECHES, AND PAPERS
ON THE
PRACTICABILITY OF THE PROPOSED
NORTH ATLANTIC TELEGRAPH.

THE
RESULTS OF THE SURVEYING EXPEDITION OF 1859.

Landslákasafn

LONDON:
EDWARD STANFORD, 6, CHARING CROSS.
1861.

LONDON

BRADBURY AND EVANS, PRINTERS, WHITEFRIARS.

CONTENTS.

	PAGE
SPEECH of John A. Dana, Esq., on presenting a flag to Col. Shaffner, Boston, U.S., on the sailing of the Telegraph Expedition, 1859 .	7
Speech of Col. Shaffner at Boston, U.S., explaining the Objects of the Telegraph Expedition, then about to sail, August 29th, 1859 .	8
Speech of Col. Shaffner at Glasgow, giving the Observations and Surveys of the Telegraph Expedition of 1859	14
Examination of Col. Shaffner, before the Committee instituted by the Board of Trade, on Electric Telegraphy, March 14, 1860 . . .	25
Proceedings of the Deputation to Lord Palmerston, requesting a Government vessel to take the deep sea soundings on the Proposed North Atlantic Telegraph Route	38
A Paper read before the Royal Geographical Society of London, considering the route, concession, telegraphic manipulation, circuits, seas, landing-places for the cables, and the icebergs .	41
Letter from Captain Osborn, R.N. in favour of the practicability of the proposed telegraphic route	47
A Paper on the Geography of the Northern Telegraphic Route, read before the British Association of Sciences, considering the Lands and Seas, Farøe Isles, Iceland, Greenland, Labrador, Ice fields, Esquimaux, &c.	50
Banquet to Captain Allen Young, and the Officers of the "Fox Telegraph Expedition"	55
Visit of the Queen and Royal Family to the "Fox," before the sailing of that vessel on the Telegraph Expedition of 1860	75



EXPLANATORY.

THIS pamphlet contains much interesting information in regard to the physics of the route over which it is proposed to construct the North Atlantic Telegraph. Its perusal will be instructive to the telegrapher, the geographer, and the navigator. The facts stated in it were, principally, collected by a surveying expedition that sailed from Boston, United States, in 1859, having in view the establishment of an electric communication between the eastern and western hemispheres.

On the embarkation of that Expedition, a signal flag was presented to it; speeches were made on the occasion, and the projector stated the objects of the voyage:—that he was going to examine the lands and the seas on the northern route, to ascertain if they could be employed for a commercial telegraph. The results of the survey are stated by Col. Shaffner in his speech at Glasgow, delivered soon after his arrival at that port; further details are given in the Papers read by him before the Royal Geographical Society in London, and the British Association at Oxford; and also, at his examination by the Committee instituted by the Board of Trade, of the British Government, on submarine telegraphy. These various documents are given in this pamphlet. They contain the observations of the Telegraph Expedition of 1859; which was conducted with much energy and a singleness of purpose.

Col. Shaffner, as a telegrapher, had considered the route electrically for transatlantic communication; but he did not, as he informs us in his Boston speech, know whether or not the route was physically practicable. After he had gone over the questionable part of it, he stated his decided opinion upon the

subject in his Glasgow speech—fully convinced that an electric telegraph could be successfully laid and maintained between Europe and America by way of the Farøe Isles, Iceland, and Greenland, and he gave very satisfactory reasons in substantiation of his opinion.

Besides the results of the Wyman's surveys, there will be found in this pamphlet an interesting letter from Captain Osborn, R.N.; an account of the deputation to Lord Palmerston, the banquet at Southampton, and the Queen's visit to the "Fox," prior to the sailing of that vessel on the Telegraph Expedition of 1860.

The various documents published in this pamphlet—although they have emanated from different persons, and given at different times and places—singularly harmonise, one with the other, in favour of the practicability of the proposed North Atlantic Telegraph.

After the arrival of the Telegraph Expedition of 1859 at Glasgow, Col. Shaffner proceeded to Copenhagen, to adjust some clauses of his Concession, and to obtain some changes of the route specified therein. In order to facilitate the enterprise, the government accorded the changes; and, to avoid complications, it became necessary for Col. Shaffner to sacrifice his expenditures of some 21,000*l.* which he had incurred under the Concession as the equivalent of caution-money; and he stipulated to deposit with the government, within ninety days, 100,000 *dols.* Danish, in substitution and in the form of a new guaranty. He applied to Mr. Joseph Rodney Croskey, of London, to aid the enterprise, and that gentleman not only paid the above sum to the government, but has advanced all the money for the purchase of the steamer "Fox," the fitting-out of the Expedition of 1860, and for all other expenditures that have been made, and, besides, he has given to the undertaking a vast amount of well-directed energy.

THE
NORTH ATLANTIC TELEGRAPH,

VIA

FARÖE ISLES, ICELAND, AND GREENLAND.

SURVEYING EXPEDITION, 1859.

[From the Boston (U.S.) Courier, August 30th, 1859.]

THE bark Wyman, of two hundred tons, sailed yesterday about 12½ o'clock from Central wharf, under command of Capt. Edward Baker, to survey the route for a line of telegraphic communication between this country and Europe, by the way of Greenland, Iceland, the Faröe Islands, and Scotland. The vessel is chartered by Col. Tal. P. Shaffner, of Louisville, Kentucky, who has been residing in Worcester most of the time for the last two years. He has projected the expedition on his own responsibility, and there appears a fair prospect of success. Previous to the sailing of the vessel, John A. Dana, Esq., of Worcester, presented Col. Shaffner a signal flag, upon which were the Masonic emblems. In making the presentation he spoke as follows:—

Colonel Shaffner: The expedition upon which you are starting is one of great importance. It is so not only in the magnitude of the undertaking, but in the vast benefits to mankind which we confidently hope shall result from your enterprise.

An Atlantic cable which shall not only unite this country with Europe, but which shall also put the two continents in successful communication with each other, is a desideratum which has for some years been deeply felt, and the practicability of such an enterprise, not only in the laying of the cable, but in operating it successfully after it shall have been laid, has occupied the attention of many minds, but of none, I may say, more than your own.

One year ago the Atlantic Telegraph Company laid the cable connecting Ireland and Newfoundland. I will say nothing with regard to its success as a Telegraph, or the probability of its ever being successfully operated. It has demonstrated to the world—what was denied by some—that an ocean cable can be laid.

You, sir, have projected the plan of a North Atlantic Telegraph. I can see no reason why we may not look with confidence for a successful termination of your project, in laying a cable through the waters contemplated in your plan, nor why we may not with equal confidence hope for its success as a Telegraph.

But, sir, I need not remind you of the importance nor the magnitude of your undertaking. I am not here for that purpose.

I am here in behalf of your friends and in my own behalf, to extend to you our best wishes on your departure, and to say "God-speed" to you and your enterprise.

And, sir, recognising in you a brother of our ancient and honourable institution of Free and Accepted Masons, and in token of a brother's friendship and best wishes, I present to you this flag. On it you behold some of the emblems of our order. Their meaning you understand, and I trust you are familiar with the practice of those virtues they inculcate.

Wherever you shall go, this flag will make you welcome. You will find it respected, because its emblems are understood.

"There is no speech nor language where their voice is not heard. Their line is gone out through all the earth, and their words to the end of the world."

Should your voyage be altogether prosperous, which may God grant, let this banner float at your mast-head; to you it will be a friendly companion; and should it chance to meet the eye of some Brother sailing upon the wide ocean, to him it will be like sounds from home wafted to him in a far country.

Should the angry sea toss your frail bark, and a lowering tempest shut out from your gaze the azure vault of heaven, let this blue symbolic flag remind you that beyond the cloud the sky is still blue and serene, and let it direct your mind, by the eye of faith, to Him in whom we trust, who maketh the clouds His pavilion, and who holdeth the sea as in the hollow of His hand—to whose protection, with our best wishes, we commend you, your family, and all connected with your enterprise.

In response Colonel Shaffner said:—

Fraternal Sir: I receive the flag which you have so kindly presented, and beg to express to you my thanks for the beautiful present, and for the kind words you have spoken for my welfare, and those who accompany me on this expedition.

For near twenty years I have been a devoted Mason. From

its altars I have received much light, and I have the highest appreciation of its benign teachings. I have passed through all the grades of the institution, and I have never seen the least thing that could be construed as objectionable to any one who had a heart capable of appreciating the works of the Supreme Being, the Grand Master who reigns supreme over that Lodge where we will surely meet, if we conduct ourselves according to the mysterious lessons presented to us in the various departments of the Fraternity.

Symbolically, in Free Masonry, the north has ever been regarded as a place of darkness. In all branches of science, the north remains a place of darkness, comparatively, even to the present day. I go on a mission to that place of darkness, to those far distant regions, "in search of more light" pertaining to physical geography.

In whatever I may do upon this expedition, or in subsequent efforts for the accomplishment of the enterprise, you may depend upon my exercising the very best of faith towards the public. My course will be within the marks prescribed by the symbolic implements, the square and compass, which so beautifully decorate the blue field of the flag you have done me the honour to present. This flag will unfurl, in the winds of the north, with the same majesty that it does in other regions where the breath of the Creator manifests benignity.

This enterprise received its first encouragement from His Majesty Frederick VII., King of Denmark, and Grand Master of Free Masons. Greenland, Iceland, and the Farøe Isles are his territories. He, as well as myself, is pledged in favour of the North Atlantic Telegraph, and, as true Masons, you may expect the object to be consummated in the best of faith.

This expedition has in view the examination of the seas, the bays, and the lands, contemplated to be traversed by the North Atlantic Telegraph, connecting Europe with America *viâ* Greenland, Iceland, and the Farøe Isles.

The project for an Atlantic Telegraph, as a speculative idea, may have originated with many, though but few have been active in the accomplishment of the great desideratum. Various schemes have been proposed, and the world has witnessed the birth and death, in infancy, of one of them—the late Atlantic Telegraph.

The North Atlantic Telegraph has not been pressed in formidable array before the world, but I have never ceased to go on with it quietly, expecting the certain and signal failure of the late oceanic enterprise, by which the practicability of the former and the impracticability of the latter would be demonstrated to the satisfaction of disinterested and impartial men.

In 1853, I commenced the advocacy of an ocean telegraph in my monthly telegraph publication, established by me, and at my own

expense, for the express purpose of promoting oceanic telegraphy. At that time the state of science permitted the opinion that a sub-aqueous conductor would successfully work across the ocean with an electric circuit of any length. Soon thereafter, the phenomena of "retardation" and "return" currents were manifested, and their developments were promulgated by Professor Faraday, of the Royal Institute, London. It then became a known fact, that an electric current had to contend against resisting forces when transmitted through submarine conductors, not common to air-line telegraphs, and that the opposing forces became, ultimately, so powerful that the currents of electricity could not be made subservient to telegraphic manipulation. In order to transmit a current of electricity two thousand miles, under water, for practical telegraphic purposes, additional discoveries or inventions will have to be made. I will not say that these discoveries or inventions will never be accomplished; but I do say that there is no fact now known, which justifies the opinion that a line from Newfoundland to Ireland can be worked practically for commercial telegraphing. With a knowledge of these facts, in 1854, I proceeded to Denmark, and obtained a Royal Concession for the exclusive rights over Greenland, Iceland, and the Farøe Isles—for the term of one hundred years—for a telegraph to connect Europe with America. In 1855, I obtained co-operative concessions from the kingdoms of Norway and Sweden, both of which Governments have constructed their lines to meet the requirements of the proposed North Atlantic Telegraph. These concessions I have the honour to hold, and their fulfilment, as a preliminary, is the object of the present expedition.

It is my purpose to sail along the east coast of Labrador to latitude 56° north, examining the bays; thence the vessel will proceed to South Greenland, where the proper places will be determined upon for landing the cable. It is possible that a part of Greenland will be traversed by an underground line, though it may be found best to land the cable and embark again from the same place. From Greenland the vessel will sail for Iceland, where like examinations will be instituted. From Iceland thence to the Farøe Isles and to North Scotland, landing at Glasgow as the end of the voyage.

Along the coasts of Labrador, Greenland, Iceland, and the Farøe Isles, and in the deep seas between them, soundings will be taken, so that the depths of the respective sections may be known.

Such are the objects and purposes of the present expedition, and I confide in the ruling of Providence that the mission may be crowned with success.

For a sum not exceeding one million and a half of dollars, the two continents can be telegraphically connected *via* Greenland, with a cable which can be successfully worked for commercial

telegraphic purposes. The lengths of the sections will be, from Labrador to Greenland, not exceeding five hundred miles; from Greenland to Iceland between five hundred and six hundred miles, depending upon the point of connection with Greenland; between Iceland and the Farøe Isles two hundred and seventy miles; from the Farøes to Scotland two hundred miles; and to Norway some four hundred miles. These sections, respectively, can be worked practically, though not with the celerity common to air-lines.

There is one fact that I desire to call your attention to, viz., that the distance between the American and European cities, telegraphically considered, will not be so great by the North Atlantic Telegraph, *viâ* Greenland, as by the Atlantic Telegraph, *viâ* Newfoundland. This is owing to the route traversed by the respective telegraph lines, the plus cable required for the seas, and the earth's surface. New York will be some three hundred miles nearer to London, and New Orleans will be about two thousand miles nearer to St. Petersburg by the North Atlantic than by the Newfoundland route.

If the physical difficulties shall prove to be not greater with the Greenland route than with the Newfoundland, there can be no reason why the two hemispheres should not be connected by a practical commercial telegraph within the next two or three years. I am prepared to press forward the enterprise, and I do assure you, sir, that I shall never cease until the enterprise has been brought to a success.

I am familiar with the working of the telegraphs in Europe and in America, and I assure you, sir, that there is not an air-line on the face of the earth that can be worked for commercial telegraphing in one electric circuit, without auxiliary or intermediate batteries, a distance of one thousand miles.

There are less difficulties in working an air-line than a submarine. The latter becomes a Leyden jar. As soon as the conducting wire is charged, as the interior coating of the jar, the water outside, as the outer coating of the jar, becomes charged with the opposite electricity. The gutta percha insulation represents the glass as in the case of the jar. The force or influence of the outer electricity retards the inner current, and ultimately prevents its onward motion. This difficulty is so great, that a line of two thousand miles cannot be successfully operated for telegraphic purposes.

Reference may be made to the supposed working of the late Atlantic Cable, to prove what I have just stated to be an error. An impartial telegrapher can see in the tortoise-like working of that cable evidence sufficient to demonstrate beyond doubt the philo-

sophy which I have just stated. That company has issued a circular, stating that some twenty-one thousand letters were sent through that cable. I have seen evidence sufficient to satisfy me that the distinguished and honourable Secretary allowed his zeal to impel him to certify much beyond the fact, though I have no doubt but what he was sincere, and believed his statements to be correct. The Secretary, last year [1858] certified in the *London Post*, that "the Queen's message, containing ninety-nine words, was received by Newfoundland in 67 minutes."* On the other hand, a despatch from Mr. De Sauty was published throughout America, that "the reception of the Queen's message was commenced early yesterday morning, and not finished until this morning," &c. Here is proof that the certificate of the Secretary of the company was not correct. But you do not require the certificate of Mr. De Sauty to demonstrate that the Queen's message was not received by Newfoundland as stated by the Secretary, because every one cannot but remember the piecemeal manner in which the message was made public—a part of which purported to have been received on one day and another part on another day. I have given you proof, sir, sufficient to cause you to doubt the correctness of any statement that may be issued claiming success for that enterprise.

I do not believe the statement, recently published by some New York speculators, that some twenty-one thousand letters were transmitted through the cable. If I had time I could readily prove to you that this is an exaggeration. Persons unacquainted with the mysterious art of telegraphing might very naturally believe it. It would be well for the officers of the company to review their statement, and make public their *arbitrary signals*. In ordinary telegraphy a single arbitrary signal often represents some twenty letters. I express my opinion, that not ten consecutive words were ever sent through the cable in any one hour after it was laid.

Even admitting that the 21,000 letters were sent through the cable during the twenty-three days its friends contend that it worked, no stronger evidence need be required to prove the impracticability of that enterprise. The line was attempted to be

* This statement has been taken from a letter, published officially by Mr. George Seward, Secretary and Manager of the Atlantic Telegraph Company, dated August 17th, 1858. Mr. Seward said, viz.:

"Immediately afterwards," having reference to a preceding despatch, "a message from Her Majesty the Queen to his Excellency the President of the United States, consisting of 99 words, was received by Newfoundland in 67 minutes."

Mr. De Sauty was the electrician at Newfoundland, and received the Queen's message. In a letter he states, viz.:

"On reference to my journal, I find that the Queen's message was commenced at 10:50 a.m. on the 16th of August, 1858, and was completed at 4:30 a.m. on the 17th; so that it occupied 17 hours and 40 minutes in its reception."

worked night and day, and by their own figures, they could only telegraph at the rate of forty letters per hour! On air-lines over sixteen thousand letters per hour can be practically telegraphed by an ordinary manipulator. What further evidence can be required to prove the folly of the scheme to connect Europe with America, from Newfoundland to Ireland?

I cannot say that the Greenland route will be practicable. There may be physical difficulties to prevent the success of that route. Electrically it can be worked, though at a far lower speed than air-lines. The sections being short, the circuits can be operated. If, however, the North Atlantic route shall be found to be impracticable, I have no faith that the two hemispheres will be united by an intelligible lightning flame until some new discoveries or inventions are made by which existing difficulties can be overcome. Cables can be laid across the ocean, however distant the shores may be apart, but unless they can be useful for telegraphing, what else can they be but evidence of the hallucination of the speculating adventurers (applause)?

The speeches of Mr. Dana and Colonel Shaffner were listened to by those present with much interest. The Masonic and the United States flags were hoisted, the word "Farewell" passed between the voyagers and their friends, the ropes were let loose, and the gallant sailing bark gently moved from her mooring on her eventful voyage amidst the repeated cheers from the bold hearts on board, and from their many friends on the shore.

This expedition has not been gotten up with "the pomp and circumstance of war." Colonel Shaffner has conducted the affair so unostentatiously that its intended departure was known to but a few of his friends until within an hour of its sailing. Many of those present could scarcely realise the seriousness of the undertaking, and they remained at the wharf discussing its novelty until the white sails of the vessel were but dimly seen in the distance.

THE NORTH ATLANTIC TELEGRAPH,
VIA
FARÖE ISLES, ICELAND, AND GREENLAND.

MEETING OF THE MERCHANTS,

Glasgow, November 29th, 1859.

THE LORD DEAN OF GUILD IN THE CHAIR.

[A SPEECH DELIVERED BY COL. TAL. P. SHAFFNER, OF THE
UNITED STATES.]

From the Glasgow Papers.

THE DEAN OF GUILD said, he had on the present occasion to introduce Colonel Shaffner, of the state of Kentucky, who had just returned from a very interesting voyage in northern latitudes, for the purpose of exploring those districts of the world, with the view of ascertaining the possibility of leading by that route a telegraphic communication from Europe to America. He had undertaken this voyage entirely upon his own resources, with the countenance, certainly, of the United States government, and with the assistance of instructions from them; but it was purely a private enterprise. He thought it could not but be a very interesting one, and one for which he deserved every credit.

Col. Shaffner then said:—

Mr. Chairman and Gentlemen,—I have no other object in view, in appearing before you on this occasion, than to present the results of my late voyage of survey for the North Atlantic Telegraph *viâ* Faröe Isles, Iceland and Greenland, to America. I am not here to ask you to subscribe for shares in this enterprise—the time has not yet arrived for you to be solicited to take a part with your capital in this great undertaking.

It is not my purpose to deliver a methodically arranged speech, but I will give you a brief history of ocean telegraphy, and of this enterprise in particular, and then explain to you the results of my recent voyage of survey for the North Atlantic Telegraph.

In 1853 I commenced to devote the whole of my energies towards the consummation of a telegraph between the two hemispheres. Some years previous to that I had been engaged in the construction of submarine telegraphs in America. My service in that capacity satisfied my mind that a telegraph line could be constructed from America to Europe. The views which I then held were not in whole subsequently sustained. It was supposed to be possible to work a line from Newfoundland to Ireland. Many telegraphers did not suppose it was possible to lay a line between Newfoundland and Ireland. The United States government about that time had instituted soundings of the North Atlantic Ocean, and the plummet found bottom in parts of the ocean which, prior to that time, had been supposed to be fathomless. Notwithstanding the bottom had been found with the ordinary plummet, telegraphers were not willing to admit that it was possible to lay a cable in the ocean. In the latter part of 1853 I commenced to advocate the practicability of laying a cable in the ocean, in a magazine established by me for that purpose. That was the first point for consideration—Was it possible to lay a cable in the deep sea? The next—Was it practicable to work a cable in the deep sea? I advocated the affirmative of both of these propositions, but did not dare to venture my reputation as a telegrapher, at that time, to deal energetically with the question. The press assailed me in every direction, and I was laughed at for my supposed folly; and one of the most prominent gentlemen engaged in telegraphing at that time made the following remark, which he published in an opposing magazine: “Would Mr. Shaffner risk a cable, such as he found necessary to span inland waters a mile in width, where they have a soft, sandy bottom, as is usually found, to the caprice and unknown powers of the ocean, where the heaviest cable would float, without gravity, to reach the ocean’s bed?” Such was the opinion entertained at that time by gentlemen in America, and you cannot find any report of others in the art advocating the practicability of an ocean telegraph. About the same time, and after satisfying my friends that it was possible to get a cable to the bottom of the sea, arose a philosophical question, denominated among electricians the “retardation of the electric current” in subaqueous conductors; that is to say, that when a current of electricity is transmitted through a wire in a submarine cable, there is a development in nature which arrests the current you propose to transmit; hence it requires more or less time for it to get to its termination. On air-lines we have nothing of that kind. Heat takes off the electricity from our lines,—so does fog; but in dry or cold air there is nothing that stops the celerity of the electric current when transmitted through air-lines. In cold

climates telegraph lines work much better than in warm latitudes. We have both in America. In the south, the wires, stretched upon the poles, in summer are often so hot that you cannot touch them without being slightly burned. During such days the conductivity of the wire is lessened, and so serious is the hindrance experienced, resulting from the wires becoming hot by the heat of the sun, that it is frequently found necessary to reduce the electric circuits to lengths under two hundred miles. I have closely observed the working of the lines in the northern states, when the cold was greater than is experienced in Greenland: they worked with less battery, and without interruption. During periods of severe cold the telegraph works the most successful. The North Atlantic Telegraph will be singularly blessed, both as to land and sea, with respect to temperature, and even if other things were but equal, the northern line will have great advantage in that respect over any other transatlantic route.

This new discovery of the retardation of the electric current was promulgated by Professor Faraday to the Royal Institution of Great Britain, and I read it with amazement. How to meet this difficulty was the next question. We found that it required an uncertain time to overcome a distance, say 1000 miles. The cable became like a Leyden jar, the interior coating of the jar serving the same as the electric conductor inside the cable, the gutta serena as the glass, the water as a conductor of electricity on the outer part around the jar, so that the very moment that we charge the inside—the conducting medium for telegraphic purposes—that very moment nature gathers around the cable outside an opposite electricity, which serves to hinder the celerity of the interior current, designed for telegraphic communication. That was experienced in the case of the late Atlantic cable. I satisfied myself then—not recently, but in 1854—that the working of a line of telegraph from Newfoundland to Ireland, a distance of 2000 miles, could not practically be consummated for commercial telegraphic purposes. As a high point in science it might be done—that I do not, nor never did deny; and even at the very time the cable was announced to be laid in America, I published a letter challenging anybody to prove that the line could be worked from Newfoundland to Ireland practically for telegraphic purposes;—the company was challenged to send through the cable as many words in twenty-four hours as could be transmitted over an air-line in five minutes! It might be possible to send at the rate of three words per minute; but what are three words per minute? A practical telegrapher would not require anything further to prove that such a telegraphic line could not subserve the purposes of commercial wants. It would be but like unto the “sounding brass and tinkling cymbal” (applause).

Finding out, then, that it would require another route than the one from Newfoundland to Ireland, I searched the seas from the North Pole to the South. That which seemed to me to be the most practicable direction possible was from Labrador to Greenland, from Greenland to Iceland, and from Iceland to the Farøe Isles, and thence to the British coasts. I visited England in 1854 to make myself familiar with the working of the respective lines, and there learned from Sir Charles and Edward Brights,—gentlemen distinguished in the science and art of electric telegraphy,—that the celerity of the electric current through subaqueous conductors was at about the rate of one-third of a second for the first 500 miles, and a full second for 900 or 1000 miles; so that, according to that progression, the transmission of a single pulsation of the electric current on a line of 2000 miles, would require nine seconds. It is the opening and breaking of the electric circuit—the transmitting of a current on the wire, and taking it off again—that constitutes the art of telegraphing. It is necessary that there should be five or seven breakages or pulsations, as an average, to constitute a letter. Telegraphically, it requires about seven letters to make a word: so that, for a pulsation, the time required would be nine seconds; the time for a letter, forty-five seconds; and the time for a word, five minutes and fifteen seconds. Some gentlemen are of opinion that successive waves of the electric current can be sent through a subaqueous conductor, one following the other, and that each wave continues separate from the other, from one end of the line to the other. Philosophically, this can be done; but, commercially, it cannot be done.

After seeing and learning all that was possible in England, I proceeded to France, and, by permission of the Imperial Government, instituted some experiments in which I was aided by the distinguished philosopher Doctor Dionysius Lardner. I next went to Prussia, thence to Denmark, and subsequently experimented upon the underground line between St. Petersburg and Moscow. I endeavoured to examine every subterranean line on both continents before making final arrangements in regard to the consummation of the proposed northern telegraph by way of Greenland. In the meantime, I obtained from the Danish government a royal concession for the exclusive right to construct a telegraph over Greenland, Iceland, and the Farøe Islands, having in view telegraphic communication between Europe and America, for the term of 100 years. That grant lies before me, signed by the King of Denmark, and having attached thereto the great seal of state (applause). It gives me ten years for the consummation of the enterprise, of which five years have expired. Within the next five years the whole line will be completed. No reason can now be seen why it should not be

o

telegraphing by that time. The time is short, it is true ; but the cables can be constructed, and the lines can be laid, by that time ; and I am satisfied in my own mind, that, unless we meet with unforeseen difficulties, you will be placed in direct commercial and in practical communication with America within the time of the concession (applause).

It is not my wish to say anything in disparagement of the line from Ireland to Newfoundland, nor to say anything in disparagement of the noble gentlemen who have advanced their means for the promotion of that great undertaking. But it becomes necessary to refer to that enterprise in making the distinction between the practicability of the respective oceanic routes. Now, it has been admitted that it is possible to transmit through a line of that length electric pulsations ; but to operate a line of that distance it would require men such as Faraday and your Thomson—men of the very highest science. But when they are gone, where will you find their equals to succeed them ? (Hear, hear.) They probably can work it sufficiently to make it intelligible, and obtain some two, or perhaps three, words per minute. I may be too practical in my ideas of the telegraph ;—we must continue it as a practical art—take from it all the high scientific clothing, and keep it within the comprehension of ordinary men. Until that is the case, we cannot make it subservient to purposes of commerce (applause).

I will now refer more particularly to the northern route, although it has been said, and by the present President of the Atlantic Telegraph Company, that it was madness to think of constructing a telegraph line by way of Greenland. Such was in the published report of his speech made in Glasgow. If that is madness, then I am mad, for I think that it is practicable, and that it will be done. I am willing to devote the balance of my life to the affair (applause) ; and if I die before it is accomplished, let it be written on my tombstone as an epitaph, ‘ I still fight for the North Atlantic Telegraph ’ (renewed applause). You have been told that the sea is too deep, that it is fathomless in some parts, that there are rocky precipices, and that the snow is scarcely ever off the ground on any part of the route. You have been told also, that the sea between Greenland and Iceland is volcanic—that the cable would get burned up, or blown up, or some other kind of destruction would happen to it—and that at Iceland and the Faröe Islands, the sea must be rocky, and that immense currents exist there which will rend the cable in pieces—all these difficulties are presented as objections to this route. They suppose that there is no other beautiful tract of ocean, with a beautiful bottom, than the one from Newfoundland to Ireland. I embarked on the late voyage to Labrador, Greenland, and the northern seas, late in the year, and did not care

about seeing the sunshine; I wanted to see the route in its worst appearance. On sounding the seas between Labrador and Greenland, and Greenland and Iceland, we found that there were beautiful bottoms, very regular and of soft mud, with not the slightest appearance of volcanic action; the Davis Strait sea gradually descends from Labrador to within 100 miles of Greenland, starting with 190 fathoms, and terminating with 2090 fathoms. From that 100 mile point it ascends gradually as far as 40 miles interior through the bays into Greenland. Such was the character and the depth of the bottom. The cannon ball, on descending with the plummet, forced it far into the mud, and the plummet drew up from the bottom what looked to be fine yellow clay. On examining this bottom there were found innumerable shells. We found that kind of bottom all the way. In the bays of Greenland it was a species of sand, apparently; but that, too, proved to be shells.

I will now, Mr. Chairman, proceed to detail to you some of the particulars of the late expedition—of its organisation and what was done during that voyage, feeble as it was, though most successful in so far as it went.

After having made repeated efforts to get the United States Government to make the necessary surveys of the proposed North Atlantic Telegraph route, and having failed to get that Government to give me its aid as petitioned for, I determined to charter a vessel, employ assistants, and go over the route myself, and see if there were so many formidable difficulties as had been supposed. Through the permission of the Secretary of the Navy at Washington, the Navy Yard at Boston furnished me the necessary deep-sea sounding apparatus.

I chartered the barque 'Wyman,' and sailed from Boston on the 29th of August (1859), for the eastern coast of Labrador. The vessel was fourteen years old, of 200 tons burthen. We had on board, master, two mates, cook, cabin boy, four men, and two boys before the mast. Mr. Samuel H. Putnam and Mr. Henry M. Sorrell, were my assistants, and my wife and son accompanied me throughout the voyage. This constituted the expedition. None of us had ever been in the Greenland seas, nor had we a chart north of the Strait of Belle Isle. To us it was an exploring expedition, and the omission of the owners of the vessel to provide us with the necessary charts, increased our risk, and decreased our chance of success.

LABRADOR.

After a voyage of fourteen days, we arrived off the mouth of Hamilton Inlet, and anchored at Brig Harbour, latitude 54°40.

Many fishermen were here, who go annually from Newfoundland, and fish in the various arms of the sea at and about this part of the coast. With a small boat we went to many of the isles, ascended the mountains, and in every way possible studied the nature of the sea, the climate, the people, and the interior.

The sea near the coast is very much divided by islands, some of which are perhaps ten miles long. The channels between these islands are navigable. The charts show a peninsula between Byron's Bay and Hamilton Inlet, but about twenty miles from the open sea there are several navigable channels connecting the inlet with the bay, and we saw a brig tack through one of them.

Off the coast, and extending some twenty miles to sea, there are many rocky islands. Standing upon the Esquimaux Isles, at the north part of the inlet, many of these rocky isles were seen, against which were lodged icebergs. Icebergs were grounded, both to the north and to the south of the inlet, but none grounded seaward at the mouth of the inlet. The most of the bergs were northward. While at anchor in Brig Harbour, Esquimaux Isles, there was a heavy gale, and we carefully watched the result at sea. Many of the bergs were moved from their groundings and broken to pieces. And, notwithstanding the wind was from the east, many of the icebergs floated south, and grounded south of the mouth of the inlet, but none entered it. We sounded off the inlet, and found deep water, and there were no shoals. From what could be learned, and from my own observations, I came to the conclusion that the waters of Hamilton Inlet entered the sea through deep valleys, precisely in contour as the lands indicated upon the coast, and that a cable could be laid in a deep valley or trench from the sea into the inlet. The bottoms of the sea and inlet were of fine sand and mud. We were informed by the old residents, that icebergs were seldom ever seen in the inlet, and as none came into it while we were there, although there was a heavy east gale, we were led to believe that there was a strong current from the inlet that forced the bergs to keep at sea.

The climate in summer is mild. On the coast there is but little vegetation. About thirty miles interior there is considerable grass and wood. Large trees of juniper, pine, and birch grow there. Turnips, cabbages, potatoes, and other vegetables are cultivated by the inhabitants. The winters are very severe, and the rivers and narrow channels are covered with ice about the thickness of the ice that makes at Quebec.

The people are mostly Esquimaux, some few Indians, and there are a few white settlements. The Moravian missionaries of Hopedale, Nain, &c., have Christianised the Esquimaux and Indians, and they are industrious compared with those living more north. The Hudson Bay Company has a station at the narrows of the inlet.

There are other traders here, and there is quite a large population upon the coast during the summer months, engaged in fishing.

Having completed my observations at Hamilton Inlet, and being satisfied that a cable could be carried into it from the sea, in water sufficiently deep to lie in safety from the reach of icebergs, we then proceeded to take the deep sea soundings across the strait to the coast of

GREENLAND.

The greatest depth of water in the strait was found to be 2090 fathoms, and the bottom was soft mud. We made the west coast of Greenland about Cape Desolation, and then navigated north to the great ice glacier north of Fredericksaab. Not having any charts, we were unable to make any particular place. We made repeated efforts to find some port, and we hoped the Esquimaux would come to the vessel, and pilot it to a harbour. In this we were disappointed. We then sailed south, intending to make Lichtenau, supposing that to be the principal place on the south-west coast of Greenland. We arrived off that place, and navigated back and forth, in and out, but we could not find any appearance of habitation. The weather was beautiful, and the coast being free from ice, it was more like a voyage of pleasure. After tacking along the coast, looking into the fiords, examining the isles, and studying the currents of the seas, until we had almost abandoned seeing any person or finding any place, an Esquimaux was seen in the distance, coming to us in a kayak. We were then full of joy, and had fresh hopes for doing some work for the telegraph. We took the Esquimaux on board, and went into Kaksimiut harbour, latitude $60^{\circ} 47'$, longitude $47^{\circ} 8'$.

From Kaksimiut we went to Julianshaab in seal-skin boats. Here we were most hospitably received and entertained. There are about 350 people at this place, mostly Esquimaux. There are many fiords or bays on this coast, and they penetrate into the interior 10, 20, and 40 miles. They are from a mile to ten miles wide, and generally very deep. Icebergs are sometimes blown into them, but they never ground, except on the shoal sides. These deep valleys seem to run meandering from the sea, and a cable would have to be laid in their crooked trenches to avoid interruption from icebergs that might be blown into the fiords. The mountains are high, and mostly barren, though we saw upon many of them grass, blue-berry bushes, and some willow-trees. Upon some of the mountains, which we supposed were about 4000 feet high, we saw patches of snow or ice. These high mountains appeared to be barren rocks, and at their bases there were many loose stones, which seem to have broken and fallen from the

heights. In the valleys we found considerable grass, and some wild vegetables, such as these samples (showing samples of the grass, about two feet long, and a vegetable stalk about three feet long).

While in Greenland, anxious to see the worst, I took much care to study that strange and indescribable part of the earth's surface and visited what is there called an ice-blink, that is, a place where the ice is forced from the interior into the fiord valley and breaks off, forming icebergs. I could not see that there need be any fear from the ice coming from the interior down the fiords; but in order to understand the movement of the ice generally, I travelled over some of it. In company with Mr. Höyer, the Assistant-Governor at Julianshaab, and Mr. Putnam, my assistant from America, I ascended the mountain on the north side of the Sermitsialik fiord, near the ice-blink. It was about 2000 feet high, and the side mostly covered with grass. When we got on top we found a beautiful little lake, with a sandy beach. We found some little snow in the crevices between the rocks, and we had snow-balling, that we might say we had actually seen snow in Greenland! We then travelled along the ridge or top of the mountain, which ran eastward; in doing this we continued to ascend, and after we had got to the ice, some five miles from the place we had reached the top of the mountain, we had perhaps attained another altitude of 1000 feet, or 3000 feet from the level of the sea. We then ascended the interior ice without any difficulty, and we travelled over it some few miles. To our right we saw the three virgin peaks, ascending high into the heavens, with patches of snow here and there whitening their black rocky forms. We had no difficulty in walking over this ice. The crevices ran east and west, and we might have easily gone over the same track with a horse. We found some small pools of water, and some patches of earth, and we could not form any idea where that earth came from. Some of it is here before me, which any gentleman is at liberty to examine. If it came from the interior, it may be possible that there are ice-free lands in those unexplored regions, and the lost Greenlanders of the 14th century may yet inhabit them—where, perhaps, for the past five centuries, they have lived in prison-like solitude!

I have no idea how thick the ice was that we travelled over. Water was heard falling over the rocks, many feet beneath. We had ascended from the moment we got on to the ice, so that at the most eastern point that we reached it was possibly some 4000 feet thick. We were above the ranges of mountains between us and the Davis Strait, and we could see far over them to sea. I presume, too, that the fiords and the mountains run interior, but far beneath the ice, and if that country was free of ice, the mountains and fiords would be found in the interior much the same as those

upon the coast. We did not visit this ice, however, for the purposes of the telegraph, except so far as its physics might have an influence upon the telegraph to Greenland, from or to the sea.

It was most dark when we got back to the ice-blink, where the veteran Motzfeldt and the Esquimaux were anxiously waiting for us. The Esquimaux had felt much anxiety and fear as to our safety, and they shed tears of joy on seeing us in the distance, descending the mountain side. They met us, and took us by the hand, one after the other, and welcomed us back, and expressed thanks to God for our safe return. Up to that moment we were not aware that we had been in any danger, nor were we, according to our ideas of danger. This circumstance is related that the audience may be able to appreciate with me these good-hearted people (applause).

We saw many icebergs during the voyage. The largest was about 80 feet high, which was in the Strait of Belle Isle. Many of them go there, and others cluster upon the east coast of Newfoundland; and it is owing to the immense collection of ice upon this coast, that vessels cannot enter the port of St. John's, Newfoundland, many weeks during the winter months.

The coast of Greenland is not approachable at all times, for the reason, that the Spitzbergen floe-ice arrives upon the south-west coast from the east coast early in February, or perhaps late in January, and it continues to move northward until in summer, when it ceases. The coast is then free from ice, and vessels can enter and depart at pleasure. It would be advisable to have a steamer for that coast. A steam vessel can enter many times through open lanes between the ice fields, when a sailing vessel could not enter for want of wind. Very often this ice continues in fields or patches a mile or more in extent, and between them several miles of open water. A steam-vessel could, therefore, go into port almost at any time during the summer months, while perhaps it might be dangerous for a sailing vessel to attempt it, even with a moderate wind.

I satisfied myself that a telegraph cable could, without any possibility of interruption from ice, be laid into the fiords of Greenland during five months of the year, and often chances within the three summer months, and that there were four months of the year when it was reasonable to consider it impossible.

Having finished our work at Greenland, we then sailed for Iceland. We rounded Cape Farewell, and approached the east coast off Lindenow fiord, within a few miles of the shore. The hills appeared to be much the same as those upon the west coast, but there was some ice or snow upon them. Had we have had time, we could have easily entered the fiords without interruption from ice. We did not see ice of any kind on the east coast in the fiords

or sea. Unfortunately a northern wind drove our vessel to sea, and further examination of Greenland had to be abandoned. We took deep-sea soundings during the voyage towards Iceland, and found the greatest depth 1540 fathoms, bottom mud.

I think the soundings taken were correct, and they show the depths to be quite regular as to ascent and descent between Labrador and Greenland, and between Greenland and Iceland. We cannot say that there is a plateau placed along this route by Providence especially for this telegraph, without respect to other things in creation; but we have reasons for believing that Providence has placed between the two continents sea-belts, that can be successfully employed for a telegraph, and to Him, for that as well as all other blessings which we enjoy, be all honour and praise (hear, hear).

Mr. Chairman, having occupied my hour, I will close my remarks, after calling your attention to the relative distances of the two routes.

It has been supposed, as another reason why this line is less preferable than the other, that the distance by way of Iceland and Greenland is greater. That is urged as an objection to this route, but let me call your attention to the facts. From London to Quebec the distance by the Atlantic line is about 4150 miles; by the North Atlantic line it is only 3684, being 466 miles nearer than the other route. From Montreal the distance is about the same; from New York to London it is nearer by 286 miles; from St. Louis to London it is 469 miles nearer; from New Orleans it is 356 miles nearer; from New York to Glasgow it is 406 miles nearer; to Berlin, 561; to Hamburg, 591; to Copenhagen, 951; to Stockholm, 1381; and from New York to St. Petersburg it is 1800 miles nearer (applause). These are the facts, and I challenge contradiction. (A gentleman asked whether Colonel Shaffner meant the sea-route only.) No; I mean the whole telegraphic distance. The distance between Ireland and Newfoundland is 1600 miles, but it requires 2000 miles of cable.

Colonel Shaffner concluded by showing and explaining the plummet by which he ascertained the nature of the bed of the ocean, and also the uses and purposes of the various Esquimaux curiosities which he had brought from Greenland.

On the motion of the Dean of Guild, a vote of thanks to the Colonel for his excellent speech, was accorded with acclamation.

A similar compliment having been paid to the Chairman, the proceedings terminated.

THE

NORTH ATLANTIC TELEGRAPH.

Extracts from an examination of Colonel Tal. P. Shaffner, of the United States, before the Committee instituted by the Board of Trade, on Electric Telegraphy.—London, March 14th, 1860. Present, CAPT. DOUGLAS GALTON, Chairman; PROF. WHEATSTONE, CAPT. WASHINGTON, R. N., REAR-ADMIRAL FITZROY, R. N., RT. HON. J. STUART WORTLEY, LIONEL GIBBORNE, ESQ., C.E., and THOS. PAGE, ESQ., C.E.

LABRADOR AND NEWFOUNDLAND COASTS AND ICEBERGS.

3914. *Question by the Chairman:* Do you anticipate any physical difficulties in landing the cable in Hamilton Inlet, and maintaining it?—*Answer by Colonel Shaffner:* Nothing more than is common to other parts of the ocean coast.

3915. What is the form of the entrance to that inlet? Is it protected on each side by ridges or rocks, or would icebergs be liable to ground in the centre of it?—I stopped some time at Hamilton Inlet, in the month of September. I examined the various bays and the coast, and penetrated into the interior, to study the character of the country and the people. The bottom of the bay is mostly a shelly formation, or shelly sand. I presume it is barnacle sand; it is a very white sand, and the mouth of the bay is very deep, running into the sea some 60 or 70 miles; it gets deeper and deeper; the width of that immense trench or trenches that enters the ocean I do not know, but the depth of it is over 350 fathoms some twenty miles from the coast. The mouth of the inlet or bay is about 30 miles wide.

3916. When you say that it is a trench, you mean that it is shallower on each side for a certain distance?—Yes; above that trench there is a shelf of rocks projecting from the coast, probably about 25 miles to sea.

3917. Would that shelf effectually prevent the icebergs, which come down from the north, from touching the bottom of the trench?—I think so.

3918. That is to say, no iceberg could pass the shelf of rock?—I know of no iceberg that descends to the depth of the bottom of that trench.

3919. But assuming there is a shelf on each side of this trench, of course, though the iceberg could pass over the shelf, it could not touch the bottom of the deeper part below it?—That is true; I saw many icebergs aground, north of the entrance of Hamilton Inlet into the sea, and south of it. I sounded north of it, and found it to be shallow, 90 fathoms, while at this trench it was 300 and odd fathoms; but below was also shallow, so that icebergs grounding above the trench, melt there and become light enough to float, and, of course, will pass over the entrance of Hamilton Inlet into the sea, and ground again below. The current carries the ice south to the east coast of Newfoundland. This northern current is checked or thrown back by the superior power or force of the gulf-stream, so that immediately east of Newfoundland the sea is composed of innumerable eddies. The iceberg and coast ice descends from the Davis Strait, some passing into the Gulf of St. Lawrence through the Strait of Belle Isle, and the larger portion hugs or nears to the coast of Newfoundland, many times filling Trinity Bay and other arms of the sea penetrating the east coast of Newfoundland. The bay of St. John's is sometimes closed with ice for several weeks, and on this account the Atlantic steamers have been prevented from going to St. John's as a port of call. Navigators have seen large icebergs on or near the coast of Newfoundland, apparently stationary, and they supposed the bergs to be on the bottom, while, in fact, many times, they were only in the eddy of currents produced by the rebounding of the current from the gulf-stream. The ice descending along the coast of Labrador does not, to a great extent, near the coast above the Strait of Belle Isle. Between the ice and the coast there are some miles of clear water, along which vessels can navigate up and down, at least as far north as Hamilton Inlet, lat. $54^{\circ} 40'$ north. And the current descending from Davis Strait does not immediately near the coast of Labrador, but is some thirty miles seaward. The tide current carries many icebergs nearer to coast, and many ground upon the shoals, which exist some twenty to thirty miles seaward. East winds sometimes force the bergs towards the coast, but the prevailing winds are from directions which prevent the bergs from coasting; and, besides, the water coming from the many rivers and bays of Labrador aid to keep them at sea. The shore or bay ice of Labrador cannot disturb an electric cable.

This ice is not more formidable than the ice in the belts of the Baltic Sea, where a cable has laid and been effective for the past seven years.

I am confident that a telegraph cable, laid into any of the bays on the east coast of Newfoundland, will be more liable to injury from the ice than one laid into Hamilton Inlet, or any of the bays of the Labrador coast south of Hopedale, or latitude 56° north. I do not think there need be any fear of interruption by the ice upon either coast; it may be possible, however, that a cable laid in Trinity Bay will be injured by icebergs; but on the other hand, the physical character of Hamilton Inlet is such that I cannot see any possibility of an interruption of a cable laid from the sea into that inlet.

THE COASTS OF GREENLAND.

3928. Assuming that a line could be satisfactorily laid out from Hamilton Inlet, to what point would you carry it on the coast of Greenland?—It would be improper for me to decide upon the precise place in advance of further examination.

3929. Or about what part?—About Julianshaab, latitude $60^{\circ} 43'$.

3930. I think you have taken some soundings between Labrador and Greenland?—Yes; I have sounded that part of the Atlantic. The depth of the water is from 1800 to 2090 fathoms at the deepest part. I brought up bottom from various parts of the Davis Strait.

3931. Does the bottom consist of shells?—The nature of the bottom was somewhat similar to the bottom from Newfoundland to Ireland.

3932. Shells chiefly?—Yes. Not having examined the specimens with a microscope myself, I am not capable of giving the precise character of the bottom.

3933. The specimens show that it was a bottom deposited under quiescent circumstances?—I have some of the bottom here (*producing a specimen*): this was taken about the middle of the Davis Strait.

3934. (*Mr. S. Wortley.*) What instrument did you use?—I used what we called Brooks's sounding apparatus.

3935. (*Chairman.*) Do you consider Brooks's sounding apparatus the best?—I am not capable of judging of that.

3936. (*Mr. S. Wortley.*) It is sufficient to bring up portions of the bottom?—Yes, it answered my purposes perfectly. I have many different specimens of bottom.

3937. Is that the instrument that Lieut. Maury used?—Yes; this is a late improvement.

3938. I suppose the bottom did not come up in that hard state?—No, quite soft.

3939. Was that specimen taken up at a great depth?—That was taken up at 1840 fathoms, latitude $58^{\circ} 20'$, longitude $51^{\circ} 50'$.

3940. Did you find any current in the Davis Strait of any importance?—Yes; I found a northward current, about eighty miles west of latitude 61° Greenland coast.

3941. Would not that current prevent the ice from accumulating on the coast?—Near the coast of Greenland I did not observe any current.

3942. Did you observe many icebergs on the coast of Greenland?—Yes; I observed in the Davis Strait perhaps a thousand icebergs, starting from the Gulf of St. Lawrence to my most northern point.

3943. Should you anticipate any difficulty in laying a cable from the presence of icebergs?—Not at all; those icebergs are from two to three or four miles apart, and sometimes ten miles; we could run right along by them, and pay no attention to them.

3944. (*Mr. S. Wortley.*) In the month of September, when you were there, the coast was the freest from ice, was it not?—I do not know.

3945. Is not September the height of the summer in those regions?—No.

3946. When does the ice first melt and come away with respect to icebergs?—The icebergs are probably the thickest in January and February, and then they thin off until the return of that season again.

3947. Are you speaking from actual observation or from the result of inquiry?—Having only been there in part of September and October, I can only speak from inquiry.

3948. (*Chairman.*) When does the floe ice commence?—In January.

3949. Was there floe ice when you were there?—No.

3950. Was the coast perfectly clear?—There were a few icebergs, but no floe ice. This floe ice does not go near the coast; it is generally some few miles distant from the coast, so that between the floe ice and the coast there is open sea.

3951. But still, if there is floe ice a little distance off the coast, it would be very difficult to lay a cable. I presume you would have to steer through the floe or be carried away with it?—With a steam vessel you can pass through openings in the floe ice.

3952. But assuming you had had a cable on board at the time

you were in the Davis Strait, could you have laid it with perfect facility from Hamilton Inlet to Julianshaab with a steam vessel?—With a steam vessel there would have been nothing in the world in the way.

3953. (*Mr. S. Wortley.*) What year were you there?—Last year, 1859.

3954. (*Chairman.*) You say that you would land a cable on the coast of Greenland, somewhere near Julianshaab. I presume in an inlet situated like Hamilton Inlet, with shelves of rock on each side, with a deep trench in the centre?—Yes.

3955. But the precise inlet you have not yet selected?—No, I have not. I saw many inlets that would answer. The bay or fiord at Julianshaab never freezes, and is clear of ice all the winter. Outside at sea in February and during the spring months, there is much ice floating, so thick that sailing vessels cannot get into the bays. The temperature of the weather at Julianshaab is maximum cold, thermometer 16° Reaumur, average 10° .

3956. What is the minimum in winter?—I have not that down; it is never excessively cold; in summer 10° to 12° plus.

3957. Do you think there would be no difficulty from the anchors of fishing vessels or other vessels in the inlets near Julianshaab?—No; there are not many of them.

3958. Assuming that you land your cable at Julianshaab, would you take it overland to the next point?—That, in my opinion, is the best plan, upon present information.

3959. Have you been over that country to any extent?—I have penetrated further into the interior than perhaps ever had been done before north of Julianshaab.

3960. What description of country did you meet with?—It is mountainous perhaps for some thirty or forty miles in the interior, covered with grass, green shrubbery, and small willows or birch, but very dwarfish.

3961. Not a rich soil?—It is too mossy to be considered a soil at all. In the interior, northward, I traversed some very extensive ice fields; the ice was flat and easy to walk over.

3962. To what point on the coast would you direct your land line on the east coast of Greenland?—About the same latitude, or probably a little south of the latitude 61° .

3963. Do you anticipate that you would find a harbour there equally convenient for landing the cable?—I saw open bays there, and hills of the same character as those upon the west coast, and no ice.

3964. Did you meet with no ice along the east coast when you were there?—None.

3965. Has not the opinion generally been that there is always a

large quantity of ice on that coast?—Yes, by persons uninformed as to the facts.

3966. Can you account at all for the fact of your not having found any ice?—Yes, because it is not common for ice to remain on that coast, and during parts of every year there is none there of consequence. I do not know that any vessels have ever approached there at that season of the year; nor is it common for vessels to go there; they imagine that it is icebound.

3967. How has the opinion arisen that it is icebound?—I suppose from the fact that in certain seasons of the year the floe ice runs from the north round by the Greenland current, and vessels in the Atlantic have observed the ice at the seasons of the year that ships frequent those latitudes, but I know of no vessel ever having visited the south-east coast.*

3969. Do vessels never attempt to go there in the autumn?—I never heard of one attempting to go there in the autumn.

3970. When was the Danish survey of that coast made?—Graah's survey was made about 1830; it commenced in 1828, I believe.

3971. Would not his vessels have remained both the autumn and spring there?—Graah went very little prepared for a survey; he had no vessels, and at the season of the year when it was desirable to be there the winds were against him. He had skin boats, which were wholly unfitted for such a service. I have travelled many miles in those skin boats, and know the danger that there is in going in the ice with them. Besides that, they are used by Esquimaux, and the Esquimaux are a timid race, so far as such an enterprise may require their services. That there are difficulties in regard to the ice is possible for much of the year, but for some four or five months I do not apprehend that there is any danger or any difficulty in approaching the coast and the open bays upon the east coast of Greenland with a steamer, but it is very uncertain about getting there with a sailing vessel for want of wind.

3972. What is the reason of the difference?—The difference is that the seasons generally are against it; when the coast is free of ice, the winds are generally from the coast.

3973. Do the winds blow off the coast at that season of the year?—Yes, it did when I was there.

3974. In which direction does the current set?—The current sets from the northward, coming between Iceland and Greenland, and sweeps around Cape Farewell and Statthuk, making a considerable eddy down to the southern end of Greenland.

* The first vessels that ever neared the south-east coast of Greenland were the Wyman, sailing,—the Telegraph Expedition of 1859;—and after, were the Bulldog and Fox, steamers,—the expeditions in 1860.

3975. Where is Stattinhuk?—Stattinhuk is at the southern part of Greenland, near Cape Farewell, but east of Cape Farewell.

3976. And the current is northward from there?—Coming from the northward between Greenland and Iceland.

3977. It is a sort of eddy down the coast?—Yes, and there is an open sea between the east coast and the floe ice. The current sweeps around the coast, and Cape Farewell, and then it goes northward into the Davis Strait. What I have stated with regard to the ice on the east coast of Greenland, is only an opinion based upon reading and upon observation the short time I was there.

3978. When you were there yourself you found it perfectly free from ice?—Yes.

3979. And no icebergs?—No icebergs at all; this was in October 1859.

3980. Was the weather fine?—The weather was very pleasant; my family could be on deck every day.

3981. Is the water deep near the east coast of Greenland?—On the east coast I think the water is deep. The east coast of Greenland, south of latitude 65° north, forms a crescent to near Stattinhuk, latitude $59^{\circ} 40'$ north. The sea within this crescent is eddy water, and floe ice is sometimes forced from the Arctic current by east winds into the eddy. The prevailing winds during the existence or presence of the floe ice in the Arctic current are from the west, north, or from between those points of the compass. These latter winds drive the ice, of whatever nature, from the coast eastward to sea, into the Arctic current, and is then swept southward around the south end of Greenland. Within the crescent, on the east coast of Greenland, I am of the opinion that the water is not deep, and that the bottom is soft mud. Such is the case wherever an eddy exists. The bays of Greenland, both upon the east and west coasts, bring to sea more or less water, which has a milky appearance, caused by the fine particles of insoluble matter held in suspension. These particles are composed of pulverised stones and earth, and are eventually deposited on the bottom of the bays, or at sea near their mouths respectively. It is natural to suppose that the bottom of the bays and the sea near the coast is deep mud, and that a telegraph cable laid thereon would not be disturbed. The currents are not strong enough or deep enough to reach the cable, and there will be no ice there that can descend to the bottom. The Esquimaux traders living upon the east coast of Greenland from time to time go south to Stattinhuk, and return between the coast and the floe ice. Their boats are made of skin and very frail. They cannot be forced through even small ice, because of their tenderness and liability of immediately sinking. Capt. Graah had to depend upon these boats when he was exploring that coast 30

years ago. We can scarcely conjecture how much more he would have accomplished, could he have had the more modern improved small boats. I think the bottom of the sea gradually descends—in valleys, near the shore—from the eastern coast to the Arctic current, say, about latitude $62^{\circ} 06'$ north, longitude $32^{\circ} 21'$ west, where I sounded, and found the depth to be 1540 fathoms, and a very soft muddy bottom. The ascent from this place to the coast, some 200 miles, would be so gradual that it would be but little more than a plain.

3982. And the bottom is not rocky?—The bottom is very soft mud.

3983. Close to the shore?—As you get nearer to the shore it is more of this barnacle sand.

3984. How did you ascertain the depth of the mud?—From the striking of the mud by my sounding rod; the cord and the rod went perpendicularly into the mud, and the cord had mud on it. The soundings in latitude $62^{\circ} 40'$, longitude 29° , at 1000 fathoms deep the mud was so soft that the ball got fastened to the rod, and I could not detach it, and I had to draw it back again into the boat.

ICELAND.

3992. At what point on the coast of Iceland would you land the cable?—Somewhere near Reikiavik.

3993. In the harbour of Reikiavik, or adjoining it?—The exact point I am unable to determine.

3994. Do you consider that the bay in which Reikiavik is situated would afford complete protection from floating ice and icebergs?—I have seen many Icelanders who assure me that there is nothing to be feared on account of the ice in the bay of Reikiavik.

3995. Is the bay of Reikiavik frozen over in the winter generally?—Never; nor does the floe ice go into the bay of Reikiavik.

3996. Is there not a great headland on the north which protects it?—Yes.

3997. In which direction does the current set at that part of the sea approaching the bay of Reikiavik? Does it set towards the north, or is there any current?—The current is between Greenland and Iceland, nearly half way, descending southward.

3998. There is no current near Iceland?—There is no current near Iceland, except the interior current that runs out from the little streams. There is no ocean current.

3999. In landing a cable at Reikiavik you would carry it, I presume, overland for some distance in Iceland?—Yes; I think it will be better to carry it overland to somewhere about Portland.

4000. Portland is the southern part of Iceland, is it not?—Yes; it is on the south side of Iceland, about longitude 19°. The determination of these points, however, ought to be fixed by a more careful examination.

4001. Is the bottom of the sea near Portland rocky, or soft and sandy?—It is sandy.

4002. Are you aware of any basaltic formation running out from the southern coast of Iceland for some distance into the sea?—I suppose that there is running out from the south-west part of Iceland, but to what extent to the sea I have no conclusive proof.

4032. Referring to Iceland, are you aware whether any banks or comparatively shallow soundings extend from Iceland considerably towards the south, say 50 or 100 miles or more?—I am unable to say.

4033. When visiting the sea south of Iceland, did you find any strength of current to interfere with the management of a ship, or with laying telegraph wires where you pleased?—We supposed we felt the gulf stream current, but we had no satisfactory proof of it.

4074. (*Chairman.*) Do you anticipate any difficulty near the southern coast of Iceland from volcanic agency?—None where I would advise the landing of a cable.

4075. You think all difficulties of that nature can be avoided by selecting your place of landing?—Yes; it would not, I think, be advisable to land it at the south-west part of Iceland. I would come more east, where there is no likelihood of finding any volcanic action.

4076. Or east of Portland?—East of Portland or about Portland, longitude 19°.

4077. Do you think there would be any difficulty from the grounding of ice there in winter?—There is no ice there at all.

4078. Is it entirely kept clear by the current from the gulf stream?—No ice can get there very well.

4079. Why could not it come?—There is nowhere for it to come from. It cannot come from the north.

4080. Does the current prevent its coming from the north? Is there a continual current from the south setting along that coast?—The current from the north takes the ice from Spitzbergen, for example, southward; it takes the ice between Iceland and Greenland. Sometimes it comes upon the north part of Iceland, and it has once or twice come down upon the north-east coast as far as Beruford.

4081. (*Captain Washington.*) You are speaking of the summer, and not of the winter?—I am speaking of ice in the icy time.

4082. In winter would there be no ice off Portland?—No.

4083. Is that certain?—That is what I have been informed by Icelanders.

4084. Are you aware that it is in latitude $63\frac{1}{2}^{\circ}$ north?—I presume, as I am looking at the map, I can see that there may be a little shore ice. When I speak of ice, I mean ocean ice—ice floes or icebergs.

4085. How many miles off Iceland do you consider that ice forms in winter from the shore?—Not having been there I cannot say, only from information derived from others; there is comparatively no ice there at all.

4086. Does your information lead you to believe that the ice extends one mile off the shore?—No; I have seen many Icelanders who have lived there all their lives nearly. I have recently had an interview with the Governor of Iceland and with members of the Iceland assembly, the Diet, and I have taken a great deal of pains to see Icelanders in Copenhagen who have lived there for many years, who were familiar with the character of the sea about Portland and Reikiavik. I make a distinction between my own observation and that which I get from others.

COMPARATIVE WORKING OF THE NORTH ATLANTIC AND THE OLD ATLANTIC TELEGRAPH PROJECTS.

4138. Will you be good enough to attach to your evidence a short estimate, founded upon transmitting ten words a minute, as to the difference of the cost of your line and the old Atlantic line?

To answer this question fully would require much time and many pages of print; I will group together a few facts based upon the present known sciences, and leave others to draw their own conclusions.

There are about 108,000 miles of telegraph lines in operation in the world, traversing different zones and under influences of different temperatures and other physical circumstances. My observations have been extensive on both hemispheres, and I have, from time to time, noted the developments manifested in the manipulation of practical or commercial telegraphy.

Air-lines traversing warm regions are much interrupted by atmospheric electricity, by incompleteness of insulation, and by conductive physics of the air, such for example as heat, fog, &c. Submarine lines are interrupted by incompleteness of insulation and by the retardation effects resulting from the Leyden jar developments, common to the transmission of electric currents through subaqueous conductors.

Throughout the whole range of the 108,000 miles of telegraph

lines, I do not believe that there is to be found in operation a commercial circuit of 1000 miles. The lines are divided into circuits, the length adopted for each depends upon the extent of the interruptions above mentioned—submarine and air-lines respectively. Air-line circuits are usually 300 to 500 miles long, and but seldom longer. It is usual to overcome distance by coupling two or more circuits together with an apparatus called a “translator” or “repeater.” Without these instruments the distance cannot be overcome, except by re-writing with the hand. Sometimes, however, auxiliary batteries are placed at different parts of the same circuit, but in submarine telegraphy we can have batteries only at the ends of the cable, and the cable can only be charged by a battery at the station of transmission. We cannot have co-operating batteries at both ends at the same time. On submarine lines the circuits are arranged as thus described, but the speed of transmission is dependent upon the length of line and the retarding force of the Leyden jar. On the many thousand miles of air-lines on the American continent we have no circuit as long as 1000 miles. In submarine telegraphy there is no circuit of that length.

The interruptions occasioned to air-lines are but equals to those common to submarine telegraphs, excepting with this difference, that on air-lines the electric force is taken from the conductor or increased in charge by atmospheric electricity, as daily experienced in warm climates, and on submarine lines it is held in suspension. The results, however, are the same. The electric force cannot be scaled to intelligible measurement. The pulsations of the electric current must be even, regular, and known as equal, at both ends of the line respecting duration. If the current is irregular the signals transmitted will be questionably received. According to a written opinion given by Sir Charles Bright, a distinguished telegraph engineer, the retardation of the electric current, transmitted through a subterranean line of copper wire No. 16, was at the rate of one third of a second for 500 miles, and one second for a distance of 1000 miles; and according to that progression, it would be about nine seconds for 2000 miles, if that length of circuit could be brought to commercial telegraphy. It is possible that a larger conductor and a greater thickness of insulation will lessen the retardation. To what extent this latter organisation of a cable would prove effective, on a long submarine circuit, remains a theory; and every practical telegrapher knows that theory in the mysterious workings of the electric telegraph cannot, in all cases, be depended upon. In the application of theory to practice new developments in physics appear, and, in many instances, wholly defeat that which theory seemed to demonstrate as certain results.

The old Atlantic line was 2050 miles long, in one continuous

circuit—the longest in the world. It was laid on the 5th of August 1858, and, at the time, it was announced as a success.

The Secretary of the Atlantic Company published a statement that 99 words [The Queen's despatch to the President] had been transmitted through the cable in 67 minutes, being less than $1\frac{1}{2}$ word per minute. Suppose that 99 words were actually received through the old cable in 67 consecutive minutes, or at the rate of 90 words per hour, the result was not favourable. The line was then capable of sending but 1800 words per day,* 18,080 messages of twenty words each per annum, which at 2l. would amount to but 36,160l. I do not think that such an income could, however, be realised on a line of that circuit and conduction. The capital of that company was over 400,000l., and the interest upon that capital and expense of administration would have required an income of at least 45,000l. I have now explained what was the result of the old Atlantic line, and what would probably have been realised. This too was after the company had assured the world that ten words per minute could be expected through the cable, and that such a result had been conclusively demonstrated.

The North Atlantic route, *via* Greenland, will be composed of four submarine sections, each operated as an independent electric circuit, as follows, viz.: from Scotland to the Farøe Isles, about 250 miles of cable, from thence to Iceland, about 350 miles; from Iceland to Greenland, about 550 miles†; and from Greenland to Labrador, about 600 miles of cable. One line of cables laid from Scotland, *via* Farøe Isles to Iceland can be so constructed as to transmit equal to three cables, or lines of communication, laid across the other two sections of the route, and if the two longer sections of the cables be constructed conformably to fixed and demonstrated laws of commercial telegraphy, twenty words per minute can be realised through the cable, seventeen of which may be considered as commercial. It remains a financial problem whether the cables shall be constructed so as to commercially transmit ten, fifteen, or twenty words per minute. On short circuits, like those of the northern route, the solution lies, side by side with our present experience in submarine telegraphy, while on the other hand, no such results can be attained on long circuits, such, for example, as from Ireland to Newfoundland.

The maximum speed of transmission of messages over telegraph lines may be estimated according to the following data:—A line that transmits 40 words per minute may be considered as perfect,

* Estimating twenty hours for commercial business, and four hours for administrative or non-commercial dispatches; and 312 working days per annum.

† If the cable is carried around to a fiord on the south-west coast, it will be about 760 miles. These figures must be considered as but proximates.

and not subjected to any hindrances whatever. One word in forty must be allowed for the line, leaving 39 words as commercial. But, besides, in a day of twenty-four hours, at least one-sixth of the time must be allowed for administrative affairs, such for example as "paid," "not paid," "repeat," "get answer," "don't understand," "send letters," "write slower," "put on more battery," &c., &c. There are many explanations that have to be sent over the line from time to time, during the day. A line that can transmit but 30 words per minute, I allow 2 for the line, leaving 28 commercial words. A line that can transmit but 20 words, I allow 3 for the line and 17 for commercial words; a line that can transmit but 10 words per minute, I allow 4 for the line and 6 for commercial words; and a line that can transmit but 5 words per minute I do not estimate any commercial result, though a few intelligible signals might be received. The preceding scale of manipulation is based upon observations and actual telegraphic experience extending over both hemispheres and many years of toil.

On the northern route, cables of required commercial capacity can be laid and maintained. If a cable, capable of transmitting but 10 words per minute be laid, giving 6 commercially, the result will be 360 words per hour, 7200 per day, 360 messages of 20 words, which at 2*l.* each will produce 720*l.* per day, or 224,640*l.* per annum; and deducting 20,000*l.* for expense of administration, there will be a nett income of 204,640*l.* A line capable of producing this result can be laid for a less sum than the capital of the old Atlantic line, which was about 400,000*l.* But a line can be constructed on the northern route, that will produce 20 intelligible words per minute, giving 17 commercial words, and 1020 per hour, 20,400 per day, 1020 messages of 20 words each per day, which at 2*l.* each will produce an annual income of 636,480*l.*

If light cables can be made to subserve the purpose of ocean telegraphy, such as recommended by Lieut. Maury, the expenditure of the same amount of money as before mentioned, by means of an increased conduction, an income equal to 1,900,440*l.* per annum can be realised, and the cost of administration not materially augmented.

In electric telegraphy, as in all other commercial affairs, I have long since learned the impropriety of expending money upon speculative theory; and never to go beyond demonstrated practicalities. The capacity of every circuit that will be on the northern route is known by their equals in length, already operating in deep seas. We have nothing to experiment upon; nothing to invent or discover.

THE
DEPUTATION TO LORD PALMERSTON
IN FAVOUR OF
THE NORTH ATLANTIC TELEGRAPH.

[The result of the interview with Lord Palmerston was the sending of Her Majesty's steam-ship "Bulldog," under the command of Sir Leopold M'Clintock, to take the deep sea soundings on the proposed telegraph route.]

[Extract from "The Times," London, May 15th, 1860.]

YESTERDAY morning an influential deputation waited upon Lord Palmerston at his residence in Piccadilly, to lay before him plans of the route of the intended line of telegraph to America *viâ* the Farøe Islands, Iceland, and Greenland, and to solicit the Government to despatch two or more vessels to take the deep sea soundings and otherwise survey the proposed North Atlantic Telegraph route. The deputation consisted, among others, of the Right Hon. Milner Gibson, M.P.; Sir J. Duke, M.P.; Mr. T. W. Russell, M.P.; Mr. H. Pease, M.P.; Mr. J. A. Roebuck, M.P.; Hon. Sydney Smith, Postmaster-General of Canada; Captain Robinson, R.N.; Dr. Rae; Colonel Shaffner, Captain Young, Mr. J. R. Croskey, Dr. N. Shaw, Mr. C. Bischoff, Mr. J. Howard, Mr. J. Arrow-smith, Mr. J. Barrow, Mr. L. S. Magnus, Mr. W. Bevan, Mr. E. Wakefield, Mr. M. H. Chaytor, Mr. C. E. Deacon, Mr. James Lyster O'Beirne, Captain Sir Edward Belcher, R.N.; Captain Collinson, R.N., &c.

Mr. Milner Gibson having introduced the deputation,

Mr. CROSKY said the object with which the deputation had sought an interview with his Lordship was to call his attention to the new route which had been proposed for effecting telegraphic communication between this country and America *viâ* the Farøe Islands, Iceland, Greenland, and Labrador; and to ask the assist-

ance of the Government in carrying out a complete survey and line of soundings along the line. He might mention to his Lordship that the line had been already in a great measure surveyed by Colonel Shaffner, who had reported most favourably as to the absence of any physical difficulties in carrying out the scheme; but that survey, as the act of a private individual, could not, of course, have the same weight, nor be so thorough and complete as was desirable before commencing an undertaking of such importance and magnitude. It was of the gravest importance for this country, both scientifically and politically, that the question of the practicability of so very desirable a route should be placed beyond a doubt, and that, of course, could only be done by a complete Government survey of the line, which they trusted his Lordship would assist them in obtaining. Believing that the scheme when carried out would be commercially profitable, it was not the intention of those promoting it to ask for subsidy, or guarantee, or money aid of any kind, but simply for such assistance in the way of survey as the Government might fairly and legitimately grant, and which would only be thoroughly satisfactory as coming from the Government.

COLONEL SHAFFNER then pointed out to his Lordship the maps and charts of the proposed route, and explained the various physical and geographical features of the line. He said the principal advantage that this route, if carried out, would possess over all others, would be the rapidity of transmission of messages. Supposing that the direct Atlantic Cable, submerged some two years since, had remained perfect, it would still not have been possible to telegraph at a greater speed than, perhaps, two or three words a minute, while he could show that the *minimum* speed of transmission by the proposed northern route, arising from their having only to work through such short lengths of submarine cable, would be at least 20 words a minute. Thus practically and commercially speaking one cable submerged by this route would represent in working efficiency many lines between Ireland and Newfoundland. Colonel Shaffner then proceeded to point out the positions along the route where, in his opinion, the cable should be laid and landed. He also explained away the difficulties in regard to the ice which had so long been thought insurmountable obstacles to the adoption of this route.

CAPTAIN ALLEN YOUNG, who accompanied Captain M'Clintock's celebrated expedition in the Fox, said he entirely concurred in what had been stated by Colonel Shaffner as to the practicability of the proposed route.

SIR EDWARD BELCHER, R.N., said that, independently of the immediate object sought to be accomplished, it would be of great

importance in the interests of science that such a survey should be carried out. It would add to our knowledge of the northern seas, and it was not at all improbable that new grounds for whale and other fisheries might be discovered.

In reply to LORD PALMERSTON's question, as to what time it was desirable that the expedition should sail, it was stated that to be of effect this year it ought to start as soon as possible.

MR. PEASE, M.P., said he thought it was extremely desirable, both in the interest of science and commercial enterprise, that such a survey should be undertaken by the Government. He considered that the Government was in duty bound to facilitate in every legitimate manner a scheme of such importance as that which proposed to secure to Great Britain direct electrical communication with the American continent. It was not, and never had been, the desire of those interested in this plan to ask for subsidies or guarantees, but only that the Government should grant assistance in carrying out a fair and impartial survey of that route, which, if found practicable, must in its results be most advantageous, both commercially and politically.

The proceedings then took rather a conversational turn, in the course of which his lordship asked a variety of questions relative to the regions proposed to be traversed, and which were satisfactorily answered by the gentlemen present connected with the Arctic discovery. After the interview had lasted upwards of an hour,

LORD PALMERSTON said that before he could grant the request of the deputation, he must know precisely what was wanted, and he would therefore be glad if they would furnish him in writing with a detailed statement of the number of ships required, the route over which the survey was wished, and the time that would probably be occupied by the expedition.

This was accordingly promised at once, and the deputation thanked his lordship and withdrew.

THE ROYAL GEOGRAPHICAL SOCIETY.

LONDON, MAY 17TH, 1860.

THE RIGHT HON. EARL DE GREY AND RIPON, PRESIDENT.

THE NORTH ATLANTIC TELEGRAPH,

VIA

FARÖE ISLES, ICELAND, AND GREENLAND.

A VERY crowded meeting of this society was held on Monday evening, May 17, 1860, the Earl de Grey and Ripon, President, in the chair. Among those present were Sir Roderick Murchison, Lord Ashburton, the Danish Minister (M. de Bille), Admiral Van Doekum, Generals Portlock and Monteith, Sir Thomas Phillipps, Sir Thomas Fremantle, Sir Charles Fellowes, Governor Edward Eyre, Sir Justin Sheil, Sir E. Belcher, the Right Hon. J. Stuart Wortley, the Earl of Sheffield, Captain J. Falbe, of Copenhagen; the Hon. Mr. Buchanan, United States Minister in Denmark; Count Strzelecki, Mr. J. Rodney Croskey, Mr. J. Crawford, Mr. Saward, Mr. Le Breton, Captains Robinson and Murray, R.N., Harrison Walker, and Allen Young; Mr. Monckton Milnes, M.P., Mr. Ware, M.P., Mr. Danby Seymour, M.P.; Drs. Rae, Hodgkin, Bigsby, Bright, Bennett, Ogle, Shea, Dobie; Major Stewart, Mr. Lionel Gisborne, Mr. A. Keith Johnson, Mr. Oliphant, Mr. St. Leger, Hon. G. Barrington, Mr. Howard, United States; Messrs. Forrester, White, and Gassiot; Mr. O'Sullivan, late American Minister to Portugal, W. S. Campbell, American Consul at Rotterdam, Mr. John Bigelow, United States.

The President called upon Col. Tal. P. Shaffner of the United States to read a paper on the projected telegraphic communication between Europe and America, *via* Iceland and Greenland.

Col. Shaffner then read an interesting paper on the above subject. He said: "Mr. President and members of the Royal Geographical Society—The North Atlantic Telegraph, which has been struggling against formidable rivalry for some years past, is

now rapidly assuming a form and proportion commensurate with the grandeur of the enterprise.

THE ROUTE.—Preliminarily proposed for this project is as follows:—First from the North of Scotland to the Bay of Thorshaven, Stromöe Isle, of the Faröe Isles. The length of the cable for this section will be about 250 miles. The next section will run from Westermanshaven, of the same isle, to about Portland, South Iceland, a distance of about 350 miles. From this landing the line will be constructed across Iceland to Reikiavik. From the Bay of Reikiavik the next section of cable will be run to some bay on the east coast of Greenland, south of latitude 61 deg. north. This distance will be about 550 or 600 miles. It is proposed to run the line across the southern end of Greenland. The fourth section of cable will be run from one of the bays of the west coast, south of the latitude 61 deg. north, to Hamilton Inlet, on the Labrador coast, a distance of about 600 miles. The aggregate submarine telegraph will be about 1750 miles;* land lines about 300 miles—total some 2050; about the same length as the Atlantic cable from Ireland to Newfoundland.

THE DANISH CONCESSION.—The Concession for this Telegraph has been granted by his Majesty the King of Denmark, so far as it may occupy Danish territory. There is no monopoly of the line reserved to the Danish Government, but its impartial use is guaranteed to the whole world. The Government has pledged itself to “bestow all necessary care, vigilance, and means which may be within its command to insure the free, impartial, and unhindered use of the said Telegraph line.” If, however, the British Government should desire a wire, for the transmission of its own dispatches, a franchise can be given to it, and the use of that franchise will be defended by the Danish Government “with all the means within its command.”

TELEGRAPHIC MANIPULATION.—There is no submarine telegraph line, with an electrical circuit of 1000 miles, nor have we any practical evidence that a circuit of that length can be worked for commercial purposes. It might be possible to organise a cable to work with some facility on a submarine circuit of that length, but to what extent would be its commerciality remains an unsolved problem. The longest sub-aqueous circuit now operated is about 750 miles, and the speed of transmission therein is some seven words per minute. On an air line of that length the transmission

* Subsequent surveys make the aggregate submarine sections about 1645 miles.

would be instantaneous, and on such lines the art of telegraphy is but a question of mechanism. On a telegraphic line constructed through the air, perfectly insulated, and traversing an even and favourable temperature, a thousand words can be transmitted in one minute by the aid of mechanism. The ordinary manipulation, however, is with the hand, by the opening and closing of a given metallic circuit charged with electricity. The maximum transmission in this manner may be considered at about forty words per minute. The speed of transmission of the electric force through submarine cables depends upon the conductivity of the metal, its insulation, and length of circuit. I have good authority for saying that experiments instituted in England with No. 16 copper wire, have proved that the electric current requires one-third of a second for the first 500 miles, and one second for 1000 miles. According to this progression, the time required to transmit an electrical impulse 2000 miles would be about nine seconds. This delay or hindrance is called "retardation." The cable becomes a Leyden jar, and the current transmitted is, more or less, held in suspension until discharged by some contrivance. It is owing to this suspension or retardation, and the irregularity of its time, that long submarine telegraphs cannot be made effective for commercial purposes.

CIRCUITS OF THE NORTHERN ROUTE.—The electric circuits of the North Atlantic telegraph will be short—the longest about 600 miles, and cables can be laid capable of transmitting at least twenty words per minute. It will be a financial question that will determine the capacity of the cables for the commercial telegraphy. Between Scotland and the Faröes, and between the Faröes and Iceland, cables can be laid that can equal the working of a double line of cables across the other sections of the route, or perhaps it may be found best to construct them for the short sections with two wires for telegraphing, and on the other sections with three or more conducting wires. If either one of the sections fail, the whole are not lost, and another cable can be promptly submerged.

THE SEAS.—The depths of the seas are but little known. A few soundings were taken on the route last autumn. The water between Scotland and the Faröe Islands, and thence to Iceland, is not very deep, not exceeding perhaps, 1000 fathoms, and there can be no doubt but that the bottom is very deep mud. The soundings taken last autumn between Iceland and Greenland proved the bottom in that sea to be deep mud. The greatest depth of water was 1540 fathoms. The mud brought from the bottom has been

examined by Professor Ehrenberg of Berlin, and he says that he found it "to contain numerous shells with life-being forms therein, which, in his opinion, exist alive at the bottom of the sea." With regard to the sand contained in the specimens, he says that "it is no rolling sand, but fragmentary, broken, and dissolved stones of mountains. The granules are not round, but with acute sides. The granite sand consists of much glimmer and quartz, with green crystal fragments, which might be hornblende were there particles of pumice-stone, but which are not at all therein to be found." From the evidence which we have in the premises, it would seem that the bottom of the sea gradually descends to 1540 fathoms from Iceland, and then in the same manner ascends to the Greenland coast. To determine the correctness of this opinion, further soundings are required. The Arctic current, perhaps some hundred feet deep, and by some supposed to be fifty miles wide, carries with it large quantities of ice, from which earth drops to the bottom of the sea. The sea between Greenland and Labrador was also partially sounded by me last autumn, and the greatest depth was found to be 2090 fathoms, which was about under the Arctic current, west of Greenland, latitude $60^{\circ} 05'$ north. West of this sounding the deepest water found was 1840 fathoms. The bottom in the Davis Strait was soft mud, except under the Arctic current, where it was coarse sand, which had been evidently dropped from the ice. On many icebergs may be seen large quantities of sand and boulders of several inches in diameter.

LANDINGS FOR THE CABLES.—The precise places for the landings for the cables have not yet been determined upon. There are good bays on North Scotland, and there need not be any fears as to that part of the route. The bay of Thorshaven, island of Stromöe, of the Faröe group, is approached from the deep sea without any obstruction, and its bottom is sand. The average depth of water in the bay is about 20 fathoms. Thorshaven is the capital of the Faröe Islands, and has about 900 inhabitants. The cable to Iceland will leave Westernmanshaven on the west coast of the Stromöe Isle. The bay is deep, bottom sand, and free from the ocean waves. On the south coast of Iceland, about longitude 19° deg. W., or at Portland, it is proposed to land the cable. The bottom of the sea approaching nearly the whole south coast of Iceland is sand. The coast is free from ice winter and summer. The cable to Greenland will run from the Reikiavik bay. The depth of water in this bay is favourable, the bottom is mud and sand. It is free from ice winter and summer, excepting a little crust near the shore. Arctic ice is never seen in that bay, except, perhaps, once in a century. Reikiavik is the capital of Iceland, and its inhabitants

have the highest degree of education. The landing-places on Greenland require to be selected with great care, and after much investigation. It is proposed to land on the east coast, in one of the many bays south of latitude 61 deg. north, Prince Christian Sound, and on the west coast near or south of Julianshaab, connecting the two with a line across Greenland. The bays penetrate to the interior ten, twenty, or thirty miles, and some of them never freeze, nor does the ice from the sea go up them but a few miles. They are very deep, and beyond the depth of icebergs; the bottoms are of mud and sand. The character of the bays on the two coasts are much the same, and the Arctic current does not approach the coast on either side. From the sea into these bays the water is deep in valleys, far below the reach of the greatest iceberg. To make the selection of the proper bays for the landings of the cables the fullest information as to the depth of water from the sea, and the localities of the meandering submarine valleys from the deep sea to the landing places on shores, will be required. Some of the inlets bring out ice, but the most of them do not; many of them are ten miles wide. As to Labrador, Hamilton inlet affords all the desired advantages. This inlet runs interior about 140 miles, and at the mouth of the bay it is thirty miles wide. The water is deep, and the bottom is sand. At its mouth there are deep trenches or valleys to sea, and a cable laid therein would never be disturbed by the ice. Above and below Hamilton Inlet there are shoals or reefs, some thirty miles from the coast, and many icebergs ground on them. After they melt or break to pieces they pass over and beyond the mouth of the inlet. They never ground at the mouth, nor do they enter into the inlet.

ICEBERGS.—The landings on the Farøe Islands and Iceland will never be disturbed by ice. They are open ports, and vessels can go and come from them at all seasons of the year. The coasts of Greenland and Labrador are beset with much ice. The east coast of Greenland is but little settled. The inhabitants trade with the colony near Cape Farewell, and they go and return from time to time in the skin boats. The Arctic or Spitzbergen current, with the floe ice, does not approach the coast, and much of the time that the floe ice runs between Greenland and Iceland the water near the coast is free from ice. The floe ice on the east coast may be seen in more or less quantities in the months of February, March, April, May, and part of June. Sometimes it appears in the last days of January, and occasionally disappears in May. The coast or berg ice may be seen throughout the year. On the east coast neither the berg nor the floe ice penetrates the bays, and a cable laid

therein would never be disturbed by them even where the water is shallow. Some of the hills on the coast are covered with grass and berry bushes. The climate is not severe. The native ice is not very thick, and if it were the cable could not be injured by it. The west coast in Julianshaab district is settled by some 3000 Esquimaux and Danes. Their houses are to be found in many of the valleys, and the skin boats are to be seen at nearly all times in some of the bays. The floe ice runs northward a few miles from the coast during the months that it is seen on the south-east coast. Between the green hills and the floe the sea is open and free from ice, except, perhaps, here and there a berg may be seen. Icebergs from the east coast and the various "blinks," will be found scattered along the west coast. Some ground on the reefs or shoals, some are blown into the bays, and others pass off, eventually, to the south. Many that are blown into the fiords never return to sea. If the fiords have currents from the interior they are taken out to sea, but if their waters be quiet, as many of them are, the bergs are blown to shoal water and ground. There they remain until the winds, the sun, and the tidal waves crumble them to pieces. Between the Arctic current and the coast many of the icebergs remain for weeks, and, in fact, until broken to pieces and melted. The largest iceberg may be some eighty feet above water, but as to its depth in the water, no one knows, nor is it possible to ascertain. The theory as to the specific gravity of ice cannot be applied to determine the depth of any given berg. The ice above water may be the cone ascending from a very broad base. In most cases very high icebergs are very wide below water, and when the base becomes reduced the berg falls, and a new projection is seen from the water. The crumbling of bergs, and the changing of their positions, are to be seen going on at nearly all times. A rough sea soon exposes the form and size of the berg, and a careful judgment can determine the probable bulk. The bergs on the Labrador coast are of the same kind as those on the Greenland coast. They go south in great quantities until checked by the eddy currents on the east coast of Newfoundland. Many of them enter the bays of Newfoundland, and a cable laid therein will be more liable to be injured by the ice than those laid on the Greenland or Labrador coasts.

The North Atlantic Telegraph is an enterprise practicable in all its parts, so far as pertains to demonstrated philosophy. In its construction and subsequent operation there will be nothing to discover, nothing to invent; but we have only to follow the sciences and arts as effective, at this time, in commercial telegraphy, and our efforts will be crowned with a success that will add new glory to the age in which we live."

THE PRACTICABILITY
OF
THE NORTH ATLANTIC TELEGRAPH,
NAUTICALLY AND PHYSICALLY CONSIDERED.

BY
CAPTAIN SHERARD OSBORN, R.N., C.B., &c.

SIR,—Will you allow me, through your columns, to bear testimony to the practical features involved in the new route for a Transatlantic cable, premising that I do so purely upon public grounds, and have neither share nor interest in either one concern or the other? Ever since it was contemplated to connect America and Britain with a submerged cable across the Atlantic, I have looked to the importance of carrying that cable across by shorter stages than the route first proposed—viz., direct from Ireland to Newfoundland. Two routes struck me as practicable, the one “North-about,” now advocated by Colonel Shaffner; the other “South-about,” *viâ* Cape de Verde Islands, St. Paul’s Rock, and Cape St. Roque, in South America. Of the two, the North-about route was the preferable; for, although a little longer in the whole course than a direct line would be, it had the great merit of being divided into four short stages, the longest of which was only 650 miles; whereas on the direct route there is one long stretch of 2000 miles of cable between Valentia Harbour and Trinity Bay. I, therefore, rejoice to see that the energy of Colonel Shaffner is directed to the establishment of this North-about Transatlantic communication, believing, as I do, without being learned in oceanic telegraphy, that, even if the direct line were open and in a working condition to-day, it could never do all the work which the public of the Americas on the one side, and that of Europe upon the other, would call for.

In a nautical and physical point of view, I know of no reasons why a cable should not connect the Canadas or Labrador with England. I am fully aware that ice streams down the coast of

Greenland and Iceland; but I do not see in what way that will affect a small cable lying upon the bottom of the sea. Icefields do not prevent the Baltic being crossed with electric cables. Ice does not cut off communication across American lakes, or Russian rivers; nor did it prevent a cable being carried round the head of the Black Sea, where in the winter there is no lack of ice. Indeed, why should it? Floe, or field ice, is the frozen surface of the sea; so long as it is attached to the shore, it is far less dangerous than surf or breakers would be. When it moves about it is afloat, and when afloat there is always water enough beneath it to allow a cable of half-an-inch or more diameter, to lie undisturbed on the bottom of the sea.

The delicate shells, weeds, crustacea, and other animate and inanimate productions which cover the bottom of the Arctic sea in latitudes far north of where it is proposed this cable shall be placed, afford the best proof that the bottom of the Northern sea is a far safer and pleasanter place of sojourn than that surface over which we Arctic seamen have lately so often sailed and laboured. People, therefore, when reading of our adventures and hair-breadth escapes in wooden vessels, within that Arctic zone, should take care not to confound the top with the bottom of the sea in those ice-incumbered regions.

That there may be some difficulties in the route I do not deny, but I see none that a better knowledge of ocean telegraphy will not every year render more easily surmountable, or none that engineering and nautical skill will not meet and master. The heavy ice-drift along the coast of Labrador indicates, in my opinion, a generally deep-water coast. Icebergs would otherwise ground far out to sea, which is not the case; but beyond that fact we know nothing of the soundings, or of that sea-coast of the Canadas, I consider the main difficulty of the North-about route to lie between the point at which about 150 fathoms water will be found on that Labrador shore, and so in to the coast. But if anywhere upon the bottom of that submerged shore of Labrador a line of deep-sea soundings can be found, with a shallower bank to the north of it, so as to form a sort of trough, running in an east and west direction, there can be little doubt, as Colonel Shaffner says, that the cable will lie there as safe as it would do across the Strait of Dover. North or south of such a trench the icebergs would naturally ground, and form what Arctic navigators term "reefs." Such reefs are common throughout the western coasts of the Davis Strait and Baffin's Bay; they mark the shoals, and, guided by them, our whaling vessels find generally deeper water free of icebergs, these deeper channels usually running into inlets or bays similar to those so common in Labrador.

A floating iceberg can never hurt a submerged cable, and even one grating or pressing along the bottom may, nine cases out of ten, fail to pick up a piece of rope imbedded in the mud or sand; indeed, the probabilities are the cable would be only thrust still deeper into the bottom. Icebergs have not got claws or creepers, and I believe the cables across the narrow seas between England and Europe run 50 times more risk from the thousands of anchors, creepers, and trawling nets ever passing over them than any cable would do under the Atlantic between Hamilton Inlet and Greenland. Arctic storms are terrible; the clash and destruction of icebergs may be awful in a winter's day off the shores of Labrador; but I do not see that they will harm a cable lying at the bottom of the sea, any more than an aurora borealis or any other Arctic bogie would do.

People who only consider subjects to discover difficulties, object that it may be impossible in the winter time to lift or repair a cable between Iceland and Greenland, or Greenland and Labrador. This objection, I maintain, holds good in all Transatlantic cables; for I have not yet heard of the seaman or engineer who will undertake to lift the 2000 miles of cable between Ireland and Newfoundland at any season, much less during the winter time.

Lastly, let me say, that Shaffner's project involves no Arctic expedition, no voyage of discovery to the Pole or the Arctic zone. That zone lies hundreds of miles beyond his northernmost point, and all he asks of England is to tell him accurately the depths of the ocean upon a route over which hundreds of English vessels annually sail, in order that he may place a cable there which shall connect us with our important colonies of the Canadas, and our important customers and good cousins of the United States. Any vessels of Her Majesty's navy, with deep-sea sounding gear on board, might be employed in the service, and I have no doubt the Canadian Government, if they saw us in earnest about the matter, would do their share in surveying the neighbourhood of Hamilton Inlet. The letter which appeared in your impression of the 24th inst. leads me to fear that the influence of the Atlantic Telegraph Company (direct) is being brought to bear against the North-about Transatlantic route. It will be a matter of regret to the public in general should this be so; for there assuredly is ample room for both these projects to be carried out, and I doubt not but that capital will be available for both, if they each endeavour faithfully to carry out their professed object—telegraphic communication between America and Europe.

SHERARD OSBORN, Captain.

LONDON, *May 26.*

GEOGRAPHY

OF

THE NORTH ATLANTIC TELEGRAPH.

BY
COL. TAL. P. SHAFFNER,
BEFORE THE BRITISH ASSOCIATION FOR THE ADVANCEMENT
OF SCIENCE, OXFORD, JULY 2, 1860.

GEOGRAPHICAL SECTION.—SIR RODERICK I. MURCHISON, PRESIDING.

MR. PRESIDENT,

LADIES AND GENTLEMEN,

It is not my purpose to discuss the commercial advantages of an Atlantic Telegraph. The cost of the line, the expense of maintaining it when made, the profits on the investment, and the advantages of one route compared with another, are questions that cannot be entertained here; but the countries to be traversed by the North Atlantic Telegraph can be considered by this section of the Association with propriety. I propose to discuss the geography of the proposed Telegraphic Route, so far as pertains to the Faröe Isles, Iceland, Greenland, and Labrador.

HISTORY OF THE PROJECT.—Before entering upon the subject proper, it is due to the friends of the enterprise to make a few remarks relative to the history of ocean telegraphy. The northern telegraph is not a new idea, freshly conceived and advanced for the consideration of men, nor has it been brought into existence by the failure of the late Atlantic Telegraph, nor do the friends of the northern route claim any advantages from the experience so dearly purchased by the shareholders of the Atlantic Company. That enterprise commenced its career in 1856. It commanded the confidence and the money of the British public. The liberality bestowed upon it by the British and American governments, and the immense investment of money and labour in it, added lustre to

the nations. It is to be lamented that the most triumphant success was not achieved. The failure of that gigantic enterprise is not alone regretted by those who placed their money in it as a speculation, but by all the civilised world. In 1854 I obtained the Danish concession to construct the telegraph from Europe to America, over the Faröe Isles, Iceland, and Greenland. The line will traverse Labrador and Canada to Quebec. The success of this enterprise was not promotive of the interest of some New Yorkers, who were the owners of the monopoly of telegraphy in Newfoundland, and it was by their efforts that the Atlantic Company was organised for the line from Ireland to Newfoundland in 1856. I mention these circumstances, that the public may know that the Northern enterprise is not of recent origin, but that it is older than the Atlantic Company. If there be a sin in the establishment of rivalry in ocean telegraphy, it does not lie with the promoters of the Greenland route. It is necessary for me to be understood, however, as not being an opponent of other lines across the ocean. I am in favour of as many as can be laid, confident that the Northern route, with its means of celerity of transmission, will have all the business it can do.

It is not now my purpose to discuss the relative merits of the ocean telegraphs, except in such matters as pertain to physics common to submarine telegraphy.

THE ROUTE—LANDS AND SEAS.—The route of the telegraph, as marked upon the map, is from Scotland *viâ* Faröe Isles, Iceland, Greenland, and Labrador, to Quebec, there connecting with other lines to different parts of America.

The sea sections of the proposed telegraphic route are as well known to all nautical geographers as to myself, excepting, perhaps, the places sounded by the Telegraphic Expedition last autumn (1859), between Labrador and Greenland, and between Greenland and Iceland. The bottoms of those seas were found to be deep mud, and a cable once laid thereon will lie undisturbed for all time. Icebergs float, and there will be no part of the sea in which the cable will be laid that the bergs will reach the bottom. It is easy for those in rival interests, or for those unacquainted with the physics of the seas, to imagine difficulties. Arctic navigators with whom I have had the pleasure of conversing since my arrival from the voyage of last autumn, agree that if the cable can be carried into deep fiords on the respective coasts, there will be no interruptions from icebergs. I have seen such fiords on the coasts of Labrador and Greenland, and therefore with me the problem is solved.

The land sections are not of serious importance. A telegraph

line can be constructed on land wherever the foot of man can be placed. I have built lines over hills and valleys where neither waggon nor beast could go, and these regions were in the great Mississippi valley, a country having great variety of soil, surface, and climate.

FARÖE ISLES.—The cable will be landed at Thorshaven, the capital of the Faröe group, and from thence a few miles by land to Westerman's haven, or to Haldervig. The island is hilly,—the roads inferior,—there is but little cultivation—pasturage good—the people intellectual—religion Lutheran—it sends one member to the Danish Parliament—it has a governor, sheriff, and other officers of state—the climate is about the same as Copenhagen, more mild than Stockholm, Quebec, Montreal, or Boston.

ICELAND.—Will be traversed by the line from Portland or Berufjord to Reikiavik. The people are highly educated, and a considerable trade is carried on between them and the Europeans. The French have some 120 vessels fishing on the south coast. They have free trade with foreign countries, and all the fisheries are free. The inhabitants are industrious and religious, and they have their own local Parliament. The country is partially cultivated, but much of the land is covered with lava. The climate is moderate; the ice never interrupting navigation on the south and west coasts. There will be no difficulty whatever in running the Telegraph across Iceland.

LABRADOR.—The cable will be landed in Hamilton Inlet, latitude north $54^{\circ} 30'$. The line will then be run either to the Gulf or to the River St. Lawrence. This country is rolling or hilly, and covered with timber, principally pine, spruce, and juniper. The trees are large, many that I saw being fifteen or twenty inches in diameter at the base. There is much grass where the country is open. Turnips, potatoes, and other vegetables are cultivated to a limited extent. The inhabitants are mostly Esquimaux. They are civilised, under the teachings of the Moravian missionaries. There is a station of the Hudson's Bay Company on Hamilton Inlet, about fifty miles from the sea. The coast is hilly and barren. Fishermen from Newfoundland are scattered along the coast, and many are employed in Hamilton Inlet. The cod and herring fisheries are the most profitable. The country is not much settled. There will be difficulties to be met in the construction of the line, and maintaining it across Labrador; but those difficulties will not be so great as those which have been overcome in other countries, those, for example, in New-

foundland, and the Southern and Western States of America. The line across Newfoundland traverses marshy and uninhabited regions, wholly unknown to the world until a few years ago when it was explored for the telegraph.

GREENLAND.—The section of the route the least known is Greenland; and although that part of the country proposed to be traversed is not so cold as the climate of St. Petersburg, a city of some 700,000 inhabitants, yet there prevail the most erroneous impressions in regard to the temperature of that interesting and wonderful country. Whether it is a continent, or numerous islands extending to the North Pole, is a problem yet to be solved. In the southern portion we find green valleys, covered with grass and vegetation, surrounded with mountains towering into the heavens; and these in the morning are covered with white glittering snow, which with the mid-day sun disappears, leaving exposed their blackened minarets and spires. The scenery is grand and picturesque.

The coasts of Greenland are barren hills and mountains. Along the shore are many islands. The fiords penetrate to the interior ten, twenty, or thirty miles. Some of these bring out ice, others do not. Into one of the fiords which are free of ice will be carried the telegraph cable, as indicated in the map. The water is very deep, and no iceberg can reach the bottom, or go far up their meanderings to their heads. They do not freeze except in narrow places where there is still water. A cable can be easily laid from the sea into one of these fiords, and when brought to land it can be well secured against native ice, as is the case at many places in America, and on the belts and sound of the Baltic Sea.

The exact locality where the line is to cross Greenland has not been determined, but it will be in the southern portion, not sixty miles north of Cape Farewell. The particular kind of surface to be traversed—whether green valleys, or mountain ranges—is not fully known, but in either case no insuperable difficulties can be foreseen. What it is in the interior, or whether there is ice there or not, no one knows. I found alluvial soil on the ice several miles distant from the sea, and it may have been blown there from the interior. Some twelve thousand deer are killed in the Høstenberg district every year. They disappear in winter. Whither do they go?

The ice travelled over by me, was solid fresh-water ice. The snow falls in small quantities. I saw on the plateau some considerable collections of water. There were many deep crevices. The thickness of the ice no one has been able to determine. I cannot say it rests upon the earth, and it may form a bridge, and perhaps where

I went it was over 4000 feet above the level of the sea ; or perhaps there was a cavern beneath, a thousand feet between the ice and the earth, exceeding in grandeur the great Mammoth Cave of America, with its two hundred subterranean avenues. This may seem most wonderful, but I have many reasons for believing that it is possible. I have been in some of the caverns. I heard a waterfall resembling the rushing of a river over rocks. The bergs from the fiord blinks, I noticed, were clear and clean ice ; no gravel or earth either in or on them, excepting those that were near the shore. If the ice were upon the earth in the interior, we might expect to find some earth in the bergs. I have seen boulders on bergs, but they came from the glaciers of the north, or from the sides of the blinks crushing against the mountains as the ice moved from the interior.

The inhabitants are Danes and Esquimaux. The Julianshaab District is the most southern in Greenland, and has about 2600 Esquimaux. They are all civilised, and mostly members of the Lutheran Church. There are a few Moravians. The children are baptised, and at fourteen years old confirmed. They have churches and schools, and they preach, sing, and pray. In the principal churches they have organs and some fine paintings.

The town of Julianshaab has about 300 inhabitants. The people received my visit last autumn with much joy. The Governor received me at the landing, and told me, " Welcome, welcome, to Greenland ! " He invited Mrs. Shaffner to take his arm and escorted her to his residence. The houses were stone and frame, and covered with slate. It is not cold enough for double windows. They had cows and sheep. The Esquimaux live in stone huts covered with earth, fully as comfortable as many log cabins that I have lived in when in the western forests of America.

The Esquimaux are honest, and good-hearted. They never steal unless on the verge of starvation. The men treat their wives well. The children are never whipped. Peace, love, and domestic happiness seem to be more common to them than to the more civilised races. It will not be difficult to have a telegraph line maintained in Greenland, with the aid of such people. We can command their labour, and there are many Danes ready to enter into the service. I have already had the services of good men offered, and at very moderate salaries. And, in fact, a telegraph line can be constructed across the hills, the valleys, and the fiords of Greenland, and it can be maintained, thereafter, with much more facility and certainty than has been done across the plains of Russia, the mountains of Norway, the swamps of Newfoundland, the inundated lands of the Mississippi, the uninhabited forests of America, or the Alpine ranges of Europe.

THE NORTH ATLANTIC TELEGRAPH,
VIA
FARÖE ISLES, ICELAND, AND GREENLAND.

BANQUET TO CAPT. ALLEN YOUNG
AND THE
OFFICERS OF THE FOX EXPEDITION,
GIVEN BY
THE MAYOR OF SOUTHAMPTON, F. PERKINS, ESQ.
SOUTHAMPTON, JULY 14TH, 1860.

THE Mayor of Southampton having determined to give a grand banquet in honour of Captain Allen Young, and the Officers of the Telegraph Expedition, before their departure on the business of the survey for the North Atlantic Telegraph, the evening of Saturday, July 14th, was ultimately fixed on for that purpose. The invitations included the Danish and American Ministers, the Premier of England, most of the men of eminence now in this country whose names are identified with Arctic travel, geographical research, or telegraphic science, the civic and municipal authorities of Southampton, and other leading inhabitants of the town. There were present about one hundred and seventy-five guests.

The banquet was given at the Royal Victoria Rooms, and was one of the most interesting and successful assemblies ever held in Southampton. The walls of the spacious banquetting-hall were handsomely draped with flags of all nations, among which those of England, Denmark, and America, were conspicuous. At either end of the room were large banners, bearing the following mottoes:—"McClintock and Young, *Par Nobile Fratrum.*" "England and America, *Nec nos Mare Separat Ingens.*" On the

wall in front of the Mayor's chair was placed a large map of the projected line, and over it the words, "Welcome to our Guests, and Honour to the Brave." An excellent quadrille band occupied the orchestra, which played at intervals during the evening.

The Mayor (FREDERICK PERKINS, Esq.) presided over the distinguished party with great ability, and was supported, right and left, by the guests of the evening. The vice-chair was filled by C. E. Deacon, Esq., the Town Clerk. Of the Expedition there were present, Captain Allen Young, Mr. J. E. Davis, R.N., Dr. John Rae, Colonel Tal. P. Shaffner, and Mr. John E. Woods; and, also, the Danish Commissioners, Lieut. C. F. Th. Von Zeilau, of the Royal Danish Army, and Mr. Arnljot Olafsson, Member of the Icelandic Diet.

The cloths having been cleared,

The MAYOR rose amid loud cheering, and said:—Gentlemen, the first toast which it is my honour and privilege to propose to you this evening is that of her most gracious Majesty the Queen, and long may she live. I believe that, as every year is added to her existence, she gains more on the hearts and affections of her people, who become more closely entwined around her throne as loving subjects. Gentlemen, I ask you to drink to the health of our beloved Sovereign (great applause).

The MAYOR:—The next toast, gentlemen, is one which is invariably received with that distinguished honour which it deserves. I give you, "The Prince Consort, the Prince of Wales, and the rest of the Royal Family." (This toast was drunk with enthusiastic cheering.)

The MAYOR:—Gentlemen, I am sure there is no town in England where the toast which stands next on the list meets with a warmer or more hearty reception than in Southampton. From this port steamers depart almost daily, with the citizens of our own country bound for America, or arrive here from the other side of the Atlantic, bringing Americans on visits of business or pleasure to this Island (hear, hear). Whilst such interchanges and continued fraternisations are going on, not only will the people of Southampton respect the President of the United States (applause), but such a strong link will bind together the two countries that nothing will, it is to be hoped, ever occur to disturb the friendship so long existing between them (renewed cheering). With an Electric Telegraph across the Atlantic, the people on both sides would be able, as it were, to stretch out their hands in fellowship across the ocean, and give each other such a hearty grip as would not easily be separated. Gentlemen, I give you "The President of the United States." (Drunk with great applause.)

Mr. BAILEY, of New York, was called upon to respond to the

toast, and was much cheered on rising. He said :—I esteem myself to be peculiarly fortunate in arriving here when you are met to inaugurate the commencement of a new effort to unite by the electric wire two countries separated by the ocean, but nearly connected to each other by kindred, and allied by sentiment and interest (cheers). It is but a short time since when we on the other side of the Atlantic were electrified by the supposed success of the first effort, but on which our hopes were afterwards doomed to disappointment. But in the lexicons of England and America there is no such word as “fail” (hear, hear); and while we must naturally sympathise with the original company, we are ready to welcome any company which may bring about the accomplishment of such a great event (loud cheers). From the year 1838, when the little *Sirius* arrived at New York, and gave the unmistakeable contradiction to Dr. Lardner’s theories as to the impossibility of steaming across the Atlantic, such repeated strides have been made that it is now become little more than a daily ferry. And now the electric telegraph is a living fact, and will soon unite the two worlds (applause). I see in England monuments everywhere to the brave—monuments commemorative of the heroes of the Nile and of Waterloo. It is a happy thing for us, gentlemen, that this is an age of peace (hear). We need no longer to immortalise only the heroes of war, but we may immortalise those noble men who, without wading through seas of human blood, reach the pinnacle of glory and of fame (immense cheering). I feel truly happy in being privileged to unite in celebrating that combination of English pluck and Yankee enterprise which is so well calculated to accomplish the uniting of the hemispheres by an electric telegraph (loud and prolonged applause).

The MAYOR :—I have next to propose for your acceptance the health of a distinguished Monarch, who presides over a brave and distinguished people—a people historically brave, historically free, not only in their institutions, but in everything that constitutes the greatness of nations (cheers). The King of Denmark has granted liberal concessions to this enterprise, and I am glad that he is represented here to-night by two gentlemen whom his Majesty has selected to accompany this expedition—one a Dane, the other an Iclander (applause). I am proud to have them here as my guests. Gentlemen, pray join with me in drinking “Long life to the King of Denmark, and success to all connected with this enterprise.” (Drunk with enthusiastic cheering.)

Lieutenant VON ZEILAU rose to respond to the toast amid loud applause. He said :—Gentlemen, it gives me great pleasure to respond to the toast which has been proposed, but let me appeal to the indulgence which is never denied in a company like this to a

foreigner who endeavours to speak in your language (great cheering). I can say of the King of Denmark that his Majesty is pleased that he is able to afford so many points in his dominions for this line of telegraph, which is to connect the United States with Denmark, Great Britain, and all Europe. It is a very important feature that this line should at all points find people originating from the same race—at one end the Scandinavians, from whom descended the Anglo-Saxons, and at the other end their descendants, the Americans (applause). This line goes through three countries, the people of which have in their origin the same blood. But there is another important similarity—all the Governments of these countries are based on real liberty, and it may be hoped that this line, which will of course send its messages into other countries, may also send with them some of that spirit of liberty by which we are all actuated (loud cheers). But that this may be done it is very important that peace should be kept in the world (hear, hear). Liberty accompanies peace, and a country which is ruled in a liberal manner always looks on peace as its best friend (applause).

The MAYOR :—The toast next on the list, gentlemen, is that of “The Army, Navy, and Volunteers.” I am greatly pleased to see each service so well represented to-night—services which ever reflect honour and lustre on the nation. The army has always done its duty (cheers). As for the navy, its achievements speak for themselves. The “wooden walls of Old England” command the respect of the world, and always will elicit it whilst the example of the past is followed (hear, hear). With respect to the volunteers, I look upon that as one of the grandest movements in this country for many generations (loud cheers). We must not forget to do justice to the services of those who protect us, and we should never meet on occasions like this without drinking to their success (loud applause).

Major RAVENHILL, R.E., in acknowledging the toast on behalf of the Army, said :—During the last few years, a good feeling has sprung up between the people and the army, but nothing at all to be compared with the important movement which has taken place within the last twelve months towards cementing together the feelings of the civil and the military portions of the population (applause). The Volunteers have sprung up like mushrooms throughout the land, and now there is hardly any distinction between the civil and the military population. I can confidently say that we in the army are much indebted to the volunteers for emulating us, and thereby instilling into our minds a laudable spirit of rivalry, and I earnestly trust that they may long continue to display that patriotism and loyalty which they have hitherto manifested so unmistakeably (great cheering).

Rear-Admiral FITZROY:—Before I presume to say a word in acknowledging the toast on behalf of that branch of the public service which you so highly esteem, and to which I have the honour to belong, permit me to express my sincere regret that the accidental fact of seniority puts me forward on this occasion, in preference to my distinguished friend on my left, who has seen so much more service than I have—I mean Sir Edward Belcher (loud and prolonged cheering). It was a maxim of the Duke of Wellington that we ought always to do our duty in whatever position of life we may be placed, not for glory or renown, but simply because it is our duty. This principle is instilled into us as boys, and it is one which we should never forget. To this principle we must look when the time may come—perhaps not far distant—when our army, navy, and volunteers will be called upon to do their duty, and not be engaged only in making preparations. May the day be far distant when they will be thus called upon, but I shall not be doing wrong, I think, in now pointing to what we may rely upon for our defence (hear, hear). Moveable defences, for this maritime country, with extensive coasts—steam-vessels armed with heavy guns, and manned by true British hearts—will, assuredly, be found as effective in any future war that may unhappily occur, as our wooden walls have been in former wars (hear, and cheers). There is one point of view from which our navy is not considered, and I may well refer to it in the presence of so many of our foreign friends. It may be looked upon as the general police of the ocean (hear, hear). By its efficiency the seas in all directions are kept free from pirates, and those rich argosies which now sail to all parts of the world are free from piratical attacks, principally on account of the navy of this country. Of course I do not leave other navies out of sight, but ours possesses numerical preponderance over them. While all honour is due to the military volunteers, those who have come forward as naval volunteers should be treated in the same manner. All ought to receive the same consideration, in whatever department they may act of those services which make the nation secure, and enable every mother, wife, and daughter, to sleep in security (great cheering).

Captain SIR EDWARD BELCHER was loudly called for from all parts of the room, and the gallant officer said:—After the complete speech of my superior, I have but a very few words to say, farther than to thank you for having so kindly noticed my name. I am rather an old officer, and have seen some service, both among the ice and in war (hear, and cheers). In the year 1815, at the siege of Gaeta, and at Algiers, when we had vessels, we had no difficulty in finding British hearts to man them (laughter and cheers). When called

upon to go to Algiers we had no men, but we stuck a Union Jack up on a pole, and went through the streets of Portsmouth and Plymouth, and manned our ships in a few days. And so will we man them again if ever any foreign forces should attempt an invasion of our shores (cheers).

Captain O'SHEA :—The great honour devolves upon me of returning thanks for the Volunteers of England. If it were not for our volunteers other nations would never know what a great and glorious country England is (applause). Every soldier and sailor is a volunteer; but, apart from them, we have now an independent body—offered by our young gentlemen and noblemen, and the young men of the middle classes, who compose a band which will oppose any invader attempting to land on our shores (loud cheers). In the name of the Volunteers, I return you thanks.

The MAYOR :—Time presses, and I will not dilate upon the next toast. It is one that speaks for itself—"The Bishop and Clergy of the Diocese, and Ministers of all denominations" (applause).

The Rev. G. BRADSHAW :—I much regret, Mr. Mayor, that the Bishop of the Diocese is not here to-night, for no man is more ready to patronise science, learning, and education generally than he. Heaven give success to the present enterprise. As the first cable has failed, I fervently trust that the second will not, but that it will unite us all in one unbroken link, and light up the flame of brotherly love and union. Then, and not till then, may we expect "peace on earth, and good-will towards men" (loud cheers).

The MAYOR :—Gentlemen, we are assembled here to-night specially to do honour to Captain Allen Young—(great applause)—and the Officers of the telegraph expeditions previous to their departure from Southampton on a survey of the telegraph route to America *via* the Farøe Islands, Iceland, Greenland, and Labrador. As Chief Magistrate of this port, I have invited them here to-night, because I felt that they ought not to leave these shores without feeling and knowing that Englishmen can appreciate merit, and do honour to them (applause). The former expedition of the Fox—"the little Fox"—of world-wide celebrity, was a very remarkable one. Let us hope that the present expedition may add to her renown, and increased glory upon the heads of those who accompany her, to take part in the surveys for the great enterprise of the telegraph. Let us, then, drink to the success of the Fox, and Captain Young and the officers of the expedition (loud cheers). The people of Southampton will watch them narrowly, and many a prayer will go up for their welfare. The toast I now propose for your acceptance, gentlemen, is—"Capt. Allen Young and Officers,

and success to the Fox." (This toast was received with the warmest demonstrations of enthusiasm.)

Captain ALLEN YOUNG, on rising to respond, was welcomed with renewed bursts of applause. The gallant officer said:—Mr. Mayor and gentlemen, I really cannot find words to express my gratitude for the kind manner in which you have received the names of my officers and myself. Reference has been made to my past services in the Fox; but I can only say that there is not a man, who was in that ship, but feels that he has had his reward in the kind reception we have experienced from our countrymen and friends (great cheering). We have met with sympathy in all directions. But we have a higher reward in the consciousness of having rendered some service to Lady Franklin, in carrying out to the end the main object of her life by ascertaining the fate of her beloved husband, and having honour done to his memory by the nation (loud cheers). For myself, I feel that I have now an additional reward in having been selected to command this glorious expedition (applause). We are going on no Arctic voyage this time—not amongst the snow and ice of that inhospitable region. We are going to the coast of Greenland, where we shall find the colonists living with their wives and families, and the same with Labrador; and as to ice, we shall find no more than is to be encountered on the coast of Newfoundland (hear). Therefore, gentlemen, we are not about to embark on a dangerous voyage, but one in which we shall only have the common vicissitudes of the sea to experience. As to the success of the voyage, why of course I must wait till we come back before I can say anything about that. But I go in the full belief that the supposed difficulties which have been talked about will melt away one by one as they are encountered (loud cheers). When I consider the capabilities of the officers who are to accompany me—Mr. Davis, who is second in command, was three years with Sir James Ross (cheers)—Dr. Rae, whose name is known by every one (cheers); when I mention such names as these, I am sure you will be satisfied that whatever may be done will be done effectually, and to the satisfaction of the country (loud cheers). I have no fear of the result. When I look at that banner, and see my name placed there in connection with that of McClintock, I feel that a great honour is done me (loud and prolonged cheering).

Mr. GEORGE FRANCIS TRAIN, of Boston, U.S.A., proposed the next toast:—Mr. Chairman,—So grand, so noble, so ancient, so dignified, so prominent among the world's assemblies, is the British House of Commons, a bolder man than myself might quail before agreeing to propose the toast that you have put into my hands. The House of Commons is always ready to benefit the nation and promote national works. The ocean is covered with a

fleet of noble steamers subsidised by this congress of the land, and no better instance can be recorded of their promptness in action than in taking Colonel Shaffner by the hand, with words of encouragement, in this great event of his eventful life (applause). The endorsement by the House of Commons of this new telegraph meets exactly the wishes of the country, and the distinguished leader of that house never did a better thing for the nation than to respond so readily to that request, for already McClintock is bounding over the billows—northward on his voyage—not this time to find the long-lost navigator, but to examine the bed of the sea for another Atlantic cable (applause). This is no unfledged idea of Colonel Shaffner's. Years ago in Kentucky he started the ball. In Copenhagen in 1854, Moscow in 1855, Paris in 1856, St. Petersburg in 1857, New York in 1858, and in 1859 on board the little vessel bound on his lonely voyage; and he was as confident then as he is to-night that some day he would lay down a cable between these hemispheres. Endorsed by the Geographical Society—endorsed by the House of Commons—endorsed by the Mayor of Southampton—endorsed by the public of both Europe and America—no wonder Colonel Shaffner and his friends have increased faith in the success of the enterprise, and they will succeed (applause). Patience, perseverance, and pluck, will accomplish anything (cheers). When Mr. Croskey's delegation, led off by the Secretary of the Board of Trade, asked Lord Palmerston for a steamer, there was no delay—no hesitation in the chief's reply; and without red-tapeism to retard the wishes of the people, the far-famed Bull-dog of the navy was on her mission over the northern seas (applause). The word went forth, and the deed was done (applause). Born the same year as Hamlet, Prince of Denmark, the House of Commons appreciates the concession of the late king by so warmly supporting this line of telegraph (applause). From olden times it has been said that—

“There is something *rotten* in the state of Denmark.”

When we consider how much tact her classic king has shown—how prompt his ministers have acted—and how well his officers have carried out their instructions, in granting this concession to Colonel Shaffner, I think we should in future say, “There is something *sound* in Denmark” (loud laughter). My time is up, and here's to “The British House of Commons!” One of the British nobility will respond, and all who know Mr. Dutton will give him the honours that belong to nature's aristocracy (applause).

The Hon. R. H. DUTTON, M.P.:—It has usually been my lot, on occasions of this character, to be called on to return thanks for

the more modest toast of the members for the southern division of Hampshire. You have now imposed upon me a more onerous task, by asking me to respond on behalf of the whole House of Commons. Well, whatever some more extreme people may say to the contrary, I do believe that we really represent the country in the main (hear, hear). At the close of a very difficult emergency, we have just come happily out of it, steered well by that experienced nobleman who now, fortunately for the country, possesses the confidence of her Majesty (applause). At other times, and at critical periods of our history, the peers have proved themselves the firm defenders of our country and its best interests. As an humble member of the House of Commons, I thank you for the kind reception which I have always met with from my constituents, especially in Southampton (cheers). Let me say, as representing part of an agricultural county, in which is comprised a large naval arsenal, that nothing gives me greater pleasure than to assist in promoting everything which shall encourage the development of those latent powers which exist more especially in a commercial town like this. I most cordially wish every success to Captain Allen Young and the North Atlantic Telegraph (cheers). Mr. Bailey has not by any means overstated the enthusiasm with which the announcement of the successful laying of the first cable was received. I was at Cherbourg at the time, and in the midst of the great show then made by the French empire, the thing which touched our ears the most were the few words that had passed between England and America by the telegraphic wire (loud cheers). Are we to give up because there has been one failure? Rather let us hope that this effort will be successful (hear, hear), and that the North Atlantic line will be the bearer, not of obscure messages of war and rebellion like those which come now and again from the East, but rather of the records of arrival of travellers to the West, and of the coming of those rich argosies which bring to this country the commercial treasures of distant parts of the world (loud cheers). The card which commanded our attendance at this festival bears the motto, "Unity is the strength of nations." The establishment of a telegraph between England and America, and the visit of the Prince of Wales to Canada, are events that will carry out the spirit embodied in this motto, and augur well for the cementing together, in even stronger fellowship than before, the two great nations whose best interests are identical, and whose future welfare and progress are involved in the maintenance of peace and concord (loud applause).

Mr. J. R. STEBBING, J.P.:—In proposing the toast which has been assigned to me, allow me to congratulate you, Mr. Mayor, on the gratifying feature of this most agreeable banquet, which you

have distinguished by gathering around you the learned and scientific celebrities of England, to inaugurate, I may say, the grand enterprise of an early and, I believe, certain and permanent telegraphic communication with the British colonies on the other side of the Atlantic, and with that great people who constitute the United States of America (loud cheers). It is true that Atlantic telegraphs have been for a time unsuccessful, but we all know that it is only for a time (hear, hear). Britons never fail (cheers). They have commenced this work, and they will assuredly be successful. With another and, I believe, a better route—with that increased experience which time has given—cheered in the work by the approbation of so many men of eminence in Arctic and in telegraphic research—the electric flash will soon reach the lands of our kindred and our own (loud cheers). Beyond these pleasing hopes and expectations, this enterprising expedition will do much for science, and therefore the distinguished labourers in that field with whose presence we are honoured this evening look with great satisfaction on the contemplated voyage. England is justly proud of her learned societies, and of the great blessings they confer on this and other countries (hear, and cheers). They are the triumphs of peace, and the promoters of everything useful and beneficial to a community (applause). Most conspicuous on the present occasion is the Royal Geographical Society of England, and whilst I invite a toast in honour of that society, I shall couple with it a name of world-wide fame—a learned gentleman known in every land—one who, whether in the present or future page of history, will always appear as one of England's most philosophic sons, ever at his post devoted to science, and cheering on every good work that can enlarge the knowledge of man, or advance the best interests of society—I mean Sir Roderick Murchison (loud and prolonged cheering). I earnestly hope that the voyage of the *Fox* will reward the countenance and support of the Royal Geographical Society, and add to its stores of knowledge. I ask you to join in an acknowledgment justly due by drinking to the "Royal Geographical Society, coupled with the name of Sir Roderick Murchison" (loud and prolonged cheers).

SIR RODERICK MURCHISON:—Mr. Mayor and gentlemen, the gentleman who has so eloquently proposed this toast, Mr. Stebbing, has spoken of the peaceful and learned gentlemen engaged in the pursuits of science. My first connection with Southampton was of a very different character. Fifty-one years ago I came here as a soldier who had served under Sir Arthur Wellesley and Sir John Moore, and was then received in a kind and hospitable manner (hear, hear). Years passed away, and after peace was restored I turned my sword into the hammer and compass of the geologist

and geographer, and in the year 1846 I again found myself here, presiding over the annual meeting of the British Association for the Advancement of Science (applause). I, therefore, know something about the progress, the hospitality, and the intellectual advancement of your town. And now I rejoice to be here once more, as representing the Royal Geographical Society, to assist in the inauguration of an enterprise, under the auspices of your excellent Chief Magistrate, pregnant with importance and fraught with interest to the future history of the world (loud cheers). I feel proud in representing the Royal Geographical Society to-night, and I find myself well supported by members of the Society, including two medallists and several Arctic voyagers. We have Fitzroy, Belcher, and Ommanney; Rae, Palliser, and the acting secretary, Dr. Shaw—when I see all these around me, and also my worthy friend, Mr. John Arrowsmith, the geographer, who teaches us all so admirably by his maps and charts, I feel as if I were really at home (loud cheers). I must now pass to another topic. I have seen Southampton under different phases, and have partaken of the hospitality of its inhabitants. But never do I remember an instance where its chief magistrate has stepped forward of his own free will and accord, to give a munificent banquet on such an important scientific occasion as the present (applause). Captain YOUNG is named on the list to propose the health of the Mayor, but, as he has asked me to act for him, I willingly accept the gratifying proposal. The admirable manner in which his Worship has conducted this banquet, the spirit he has thrown into the proceedings, and the impetus he has thereby given to the great scientific enterprise which it is intended to inaugurate, are all alike commendable (applause). Let us, therefore, drink a bumper to his health, and long may the town of Southampton have such Mayors as Mr. Frederick Perkins. (The toast was drank with several rounds of cheering.)

The MAYOR, who was received with renewed applause on rising, said:—Gentlemen, I can assure you I feel much gratified at the reception you have given to this toast. During my period of office I have ever looked to the advancement of the town (hear, hear), determined to follow in the wake of one who, whilst in this transitory life, threw his money and energies into everything calculated to advance the interests of the port. I am but a young disciple in the school of RICHARD ANDREWS, but I have learnt a lesson which will, I trust, throw no discredit upon me in my endeavours to do as much good as he did (loud cheers). I am pleased beyond measure in being the humble instrument of bringing before you gentlemen eminent in learning and science on this occasion; and shall ever feel a pride in maintaining the honour of my native

town, and advancing its prosperity, never losing an opportunity of paying honour to those to whom honour is due (loud cheers).

Rear-Admiral FITZROY :—I had no idea, gentlemen, until I saw the paper, that so humble an individual as myself would be called upon to propose a toast of such importance as that which I have now to submit to your acceptance. But I suppose that, filling a small office under Government, which is more or less engaged in objects connected with those embraced in the pursuits of telegraphic science, I am therefore expected to propose this toast, and say a few words in explanation of its subject. Be assured, however, gentlemen, that no office which I may hold, nor the interests of any particular company, will influence, in the slightest degree, any words which I may use (hear, hear). I should feel myself unworthy to hold any office under the Government if I were not to speak freely on such a question as this (hear, hear). I have to ask your attention for a few minutes to a somewhat dry statement of matters of business, but I trust that no one present will object to give it to me, knowing that the business part of this question must be discussed gravely sometimes (applause). In the last few years three distinct propositions have been put before the public for opening up telegraphic communication with America. One was the well-known proposal for a line from Ireland to Newfoundland, which was marvellously successful at first, and has been as marvellously a wonder since because it has not been continued, and the experiment repeated which so astonished the world. Another proposition was to go by the islands on the coast of Africa, uniting England, Gibraltar, the Cape Verde Isles, Brazil, West Indies, and United States. This line required only short lengths of wire throughout, but it presented the practical difficulties of very numerous stations, interchanges with many countries, and an organisation almost too complicated to be maintained by one central board. The subject of telegraphy is the great practical scientific question of the day. It is more important to the welfare of nations than any other, and it behoves all electricians to apply themselves to it, and encounter every impediment which presents itself. But the difficulties in the way will undoubtedly cause a considerable time to elapse before this southern line can be constructed. All know the difficulties connected with the direct Atlantic line, on account of the transmission of the electric current through such a length of submarine wire, and other causes. Whether electricians have as yet ascertained the proper kind of wire—whether a larger wire, and a different method of insulation, will succeed better than that already tried, time will prove. Now I come to consider the other proposal, namely, that shown on the map before us, to run by way of Iceland and

Greenland. Experience in telegraphy has proved that long lines are not as yet successful—that a line of 600 or 700 miles, even on land, is as long as will pay commercially when operated by one electric circuit; and as this is a commercial undertaking it must be so viewed (hear, hear). I am one of those, however, who think that Government should lend its aid to such an undertaking at first. If we look back to history we shall see that all great national undertakings have been aided by Governments which did not wait till commercial success was sure before giving their aid. There are exceptional cases in which Government ought to take the lead and direction. My own view is decidedly favourable to the northern line, which is to be in short lengths of submerged wire: no one portion being more than 600 or 700 miles. The greatest depth which has been sounded, either between Greenland and Iceland or Labrador, or between Iceland and our own coast, is 2000 fathoms, and it has been proved by experience that a depth of 2000 fathoms presents no great obstacle to laying an electric wire (hear, and cheers). I do not think, from the soundings which have already been taken, that a much greater depth will be found on any part of the route. I have carefully examined the log of the vessel which took Colonel Shaffner from one point to another—the tables, soundings, calculations, &c.; and I thoroughly believe that the soundings were well and accurately taken (applause). I was one of the committee appointed by the Board of Trade before which Colonel Shaffner was examined, and no evidence ever made a stronger impression on my mind than the statements he gave with so much modesty and consistency (applause). Some persons are not aware that, while we are talking about the subject, our American friends are actually sounding many parts of the Pacific Ocean. I feel shame at having been behind-hand, and think that the sooner we follow their good example the better (cheers). We ought to have taken the initiative in sounding the bottom of the ocean. When the Chinese expedition is over, and our smaller vessels are once more set free, no better employment can, I am sure, be found for some of them than in exploring the bottom of the ocean (loud cheers). The facility with which a telegraphic wire can be carried from Scotland to the Farøe Islands requires no remark from me. Whether it will be better to have one or two landings or stations in Iceland and in Greenland, will be for Shaffner, Young, and Rac to determine by their judgment according to the result of the survey. Colonel Shaffner and Captain Young are perfectly acquainted with that region. Of the men composing this expedition I need scarcely say anything. The names I have mentioned are well known in the active world, and with this remark I leave them. Mr. Davis, who goes as second in

command, served under me twenty-five years ago, and I found him even then a good surveyor and draughtsman (cheers). The selection of officers which has been made reflects great credit on those who arranged this expedition. I am sure the time will come when you, Mr. Mayor, will be glad that, by your exertion, your hospitality, and your cordial welcome, you helped to cheer forward so truly important an expedition (applause). Not only will this line unite us with America, but by branch lines with Norway, Sweden, Denmark, Russia, and Prussia; thus bringing the whole northern continent of Europe into connection with Canada and the United States. There is nothing to be done but what has been practically proved capable of accomplishment by men possessing the necessary judgment and energy for such a subject. Colonel Shaffner has been engaged in carrying out telegraphs beyond the Alleghany mountains (hear, and cheers). There is nothing on the coast of Labrador, under water, or in the ice of Greenland, to prevent the success of the undertaking. The notion of damage to the wire by icebergs is a mere bugbear. While an iceberg floats no wire once laid can be touched by it, and in shallow water care will be taken to avoid abrasion by laying the wire between headlands which prevent icebergs from entering those valley-like fiords up which the wire will be carried. Believing the northern line to be the one likely to succeed soonest, for the reasons I have stated, I have much pleasure in proposing—"Success to the North Atlantic Telegraph, coupled with the names of Col. Shaffner and Dr. Rae" (loud and long-continued applause).

Colonel SHAFFNER, whose rising was the signal for a renewal of the applause, said:—I would much rather be engaged on the service of the telegraph at this moment than be here (hear, and cheers), honoured even as I am by this distinguished company. I should feel myself more at home in carrying on this enterprise on the route itself, than in being honoured by the most distinguished men in the world (applause). In it my whole heart and energies are absorbed. Seven years have I been engaged in it, and seven years more I am willing to devote to it if necessary, and if my life be spared—ay, seventy times seven, if it were possible—in order to succeed in establishing a connection between the two hemispheres by one electric flash (loud cheers). I am anxious to see not only this line carried out, but others. There is work enough for all. But this one is my special object. In 1854 I petitioned his Danish Majesty for this, and he made no special reservations for the people of Denmark, but granted me a concession, to be free, liberal, and open to all (applause). The King of Denmark pledged in the concession to support its impartial use, and that the telegraph should be without restriction—free as the constitution of

Denmark, free as the liberties of England, and free as those of my own nation (loud cheers). What could be more liberal than the concession given by the King of Denmark? I ascribe all honour to him for what he has done. During the last two years I felt that the time had come to do something more tangible for the construction of this telegraph, and I appealed to the United States Government, but failed to get a ship for the survey. "Constitutional difficulties" stood in the way, as they always do in my country when any great enterprise is to be promoted. I chartered a vessel at Boston, and sailed on the 29th of August, 1859, on a voyage of survey to Labrador, Greenland, and the northern seas. I took my family with me, for I did not believe there was any danger. On our first reaching Greenland we were saluted with the English word "Welcome!" Every respect was paid us, and I found every desirable convenience for landing the cables (loud cheers); there were no inaccessible fiords; the coast was not ice-bound, but open. After taking soundings, and coming to England, I found opposition everywhere; my word was disputed; and even the concession was promised, in Denmark, conditionally to others. However, my friend Mr. Joseph Rodney Croskey assisted me, and more credit will be due to him than to me if this enterprise is carried out successfully. We appealed to Lord Palmerston. I had never seen him, but he proved to be the greatest man in the world to us (hear). He wanted only to know the facts, and we gave them to him. He sent to the Admiralty, and the Bulldog was at once granted, and McClintock volunteered to take command—no "constitutional difficulties," as was the case in my own country, stood in the way with Lord Palmerston (loud cheers). At this moment the gallant McClintock is taking the soundings of the deep seas, and you know he is an officer that does his work well (applause). The Geographical Society has given it a hearty recognition, for which I thank the members; and the promoters of the enterprise will be glad to give them in return all the results of the survey. Capt. Allen Young is to have command of the Fox and marine surveys. His name is inscribed in golden capitals on the pillar of Arctic discovery (loud cheers). Dr. Rae is to have command of the land expeditions, and you know his fame (great applause), for it is known throughout the civilised world (applause). I suppose you will all have confidence in the reports of Young and Rae (applause). I am nothing, but I go with the expedition to assist both gentlemen, that they may shape their surveys telegraphically. I thank you all, Mr. Mayor and gentlemen, for the reception you have given to the toast. When we get back we shall make our report. I cannot, of course, say that it will be perfectly successful, and demonstrate beyond doubt the practicability of the

enterprise, but I can promise you that it shall tell the truth (great cheering).

Dr. RAE: Every undertaking is composed of small particles; and as one in the present, I thank you for the expression of your sympathies. I have had some acquaintance with Arctic travel, and, having heard Col. Shaffner's statements of his recent surveying expedition for the proposed telegraph, I am satisfied that there is a chance for a success by this route, and I have thus been led into this undertaking as a volunteer (hear, hear). This must not be considered as an Arctic voyage. I have readily volunteered to accompany Col. Shaffner, and do all I can to aid the undertaking and to promote science. Having accompanied four or five expeditions to the Arctic regions, and accustomed to travelling and doing different kinds of work common to such expeditions, I have a hope that my services will be of some use to the enterprise. And as I will be accompanied by Col. Shaffner, who is well known as a practical telegrapher, I hope to accomplish satisfactory results for the proposed telegraph (hear, and cheers). When we get on board I am sure we shall be as jolly a set of fellows as can be (laughter and cheers). One great and important object in all such undertakings should be to understand each other—all and each should state freely from time to time their opinions and differences—and not return attacking each other (hear, hear). I feel sure that we on this enterprise shall act on this principle (loud cheers).

Capt. MANGLES proposed, "The Electric Telegraph Companies, coupled with the names of Mr. W. Fothergill Cooke, Sir Charles Bright, and Mr. C. V. Walker, F.R.S." Mr. Cooke had given up a noble service and devoted himself to the pursuits of telegraphic science, and had been ably followed by Sir Charles Bright and Mr. Walker.—The toast was drank with loud cheering.

Mr. W. FOTHERGILL COOKE:—I always feel pleasure in rising to acknowledge this toast, and I trust that many years will pass away before the toast is forgotten (hear). I am the oldest director of the oldest Company ever formed for the furtherance of electric telegraphy, and I feel pride in the fact that I assisted in the first movement for its practical application in the world (hear, hear). It is now generally admitted that I was the first inventor of this great and now widely extended system (loud cheers). But I never feel pleasure in hearing my name connected with this subject unless it is associated with my scientific coadjutor, Mr. Wheatstone (applause). It is now twenty-four years since the electric telegraph was first brought practically before the world in the names of Cooke and Wheatstone. But that is a matter of history, and we have not met here to-night to celebrate the early days of the parent invention, which in a quarter of a century

has attained the maturity of an established institution in all civilised countries, and is fast extending through semi-barbarous lands, but to inaugurate the advent of a yet unborn descendant—the Danish, British, and American Telegraph. The expedition now about to sail from this port is going forth under the most favourable auspices to confirm, by fresh and accurate surveys, the facts stated by Col. Shaffner, the spirited projector, as the result of his own inspection last year (hear, hear). They are practical men going on a practical inquiry, to justify, by accurate knowledge, another grand transatlantic telegraph scheme. The telegraph has never been a scientific question since it assumed a practical shape in 1836. Its most energetic supporters have gone before, and beyond, science, in forcing the telegraph over mountains and under oceans. The necessities of the telegraph have formed many of its best scientific advisers from the ranks of its own practical school. The projectors and supporters of the present undertaking are all of that school, and they have called to their aid, for this expedition, men of the same class; and their combined report will receive a proportionate amount of public confidence. This expedition is not in reality for a scientific inquiry. Practical men have gone before to ascertain the practicability of their scheme, and they now, before carrying it out, call upon the practical men of other professions to examine into their plans, and to point out the obstacles, if there are any, to a successful result. I believe that in England and America there exists sufficient energy and force of will to carry into effect, without Government aid, whatever enterprise practical men prove can be accomplished (applause). There are two names coupled with my own in this toast which have acquired well-earned reputations in telegraphic affairs. I am proud to say that Sir Charles Bright was a pupil of mine, and the other gentleman (Mr. Walker), a Fellow of the Royal Society, was also introduced by me, many years ago, to the electric telegraph; and I am pleased to see them here to-night to answer for themselves. The Mayor has, on this occasion, done honour to Southampton by every possible hospitality; but he has forgotten one point on which he might have claimed a telegraphic honour for this ancient port. Perhaps the tradition has not been handed down to him—it is of so ancient a date (laughter). I mean that Southampton was the first town in England which was brought into telegraphic communication with the metropolis. The London and Southampton Telegraph was the first telegraph established as a commercial enterprise in the world, and the South-Western Company formed a partnership with me in erecting and working the telegraph at our joint expense (hear and cheers).

SIR CHARLES BRIGHT: Mr. Mayor and Gentlemen, I thank you most heartily on behalf of the Companies with whose interests

I am associated, for the kindness and cordiality with which you have greeted this toast, and on my own part for the pleasure I have had this evening in being present at so deeply interesting a meeting as this. I feel, however, somewhat in the position of an apprentice called upon to speak in the presence of his master and foreman, for Mr. Cooke, as you know, introduced the electric telegraph in a practical form to the world, and Mr. Walker had been a laborious worker in the field of electrical development for some years anterior to 1847, when I first became connected with telegraphic progress. If there could be in the mind of any person present at this banquet an alloy to the satisfaction of witnessing the infant steps of this great enterprise, and of wishing good speed to Captain Allen Young and his distinguished associates, I might perhaps be pardoned for such a feeling, for after labouring for years to carry a wire across the Atlantic, I now find myself at the inauguration of another line, which some appear to consider opposed to the route by which I laid a line two years ago. I am, however, free from any such disturbing reflections (hear and cheers). My greatest desire is to see a telegraph at work again between this country and America, and should it not fall to my own lot to land the end of another and more lasting cable, I shall be the first to throw up my hat and rejoice at the success of others, whether the line is carried by the northern, the central, or the southern route (loud cheers). I hope to see several lines of telegraphic communication with America, and I trust that the result of this survey will be such as entirely to clear up any questions as to supposed obstacles in the neighbourhood of those northern shores where the cables by this route are to be carried, and thus to remove the only doubt which has been suggested as to the value of its advantages. Wishing the line every success, and an early realisation of its important objects, I thank you again, Mr. Mayor, for the privilege of being here this evening (loud cheers).

Mr. WALKER:—It is highly gratifying to me, Mr. Mayor, to see that the South-Eastern Railway Company's telegraph system, which has grown up under my care, is thought worthy of being associated (in the toast that has just been proposed), with the two great telegraph Companies—the Electric, represented by Mr. Cooke, and the Magnetic, represented by Sir Charles Bright; and it affords me no small pleasure to hear my old friend and patron, Mr. Cooke, give so good a character to our system, which, although as distinct from the two great telegraph Companies as they are each from the other, yet holds friendly relations with them both. We are a quasi-telegraph company. Our scientific resources are not great; in my proper person, the functions of several of their offices are discharged. I claim not to rank with Mr. Cooke in the

self-denial he manifested in early days, when he found a couch in a railway carriage, after labouring day by day in bringing his invention into actual use; nor with Sir C. Bright, in the risks he ran when the Agamemnon, freighted with the Atlantic Cable, was well nigh lost beneath the billows of the Atlantic. My labours have been of a less exciting character. I have listened, sir, with great interest to the remarks that have been made by the eminent men who are in this room to-night touching the North Atlantic route. They are encouraging in the highest degree. We have heard from men who are well qualified to form an opinion, whose opinion is of the highest value, that the sea risks in the proposed route are only of the average character; they are not such as to fill the promoters of the undertaking with dread. I gather from the remarks that have reached me that ice and icebergs are little to be feared. The landing places require to be well selected. Our brave pioneer, Capt. Allen Young, is about to leave us to carry out the necessary survey, and to make his selections; and we have the fullest confidence in his discernment, and feel sure that he will bring back a full and faithful report. Should his surveys be satisfactory, and the cables be safely made and laid, no fears need be entertained as to their working well and profitably (hear, and cheers). I am one of the fortunate few who had the two ends of the Atlantic Cable, 2600 miles in length, before me in the same room, and became tolerably familiar with the behaviour of electric currents when presented to such a conductor (hear, hear). You will have no such conductor as that. Your route is broken up into sections, the longest of which may be called short when compared with the length I have named. I will not at this late hour venture to explain the general behaviour of electricity in cables. There are certain specialties that become very conspicuous in extreme lengths but which are so modified in such short lengths, as those with which you have to deal, that they cease to be a source of anxiety. I have heard that it is proposed to lay a duplicate cable in each of the 600 mile lengths. This is an admirable proposition. Should any mischance occur to one cable, the communication would not be cut off, and should both remain good, the advantage of a double line on the long lengths would be gained. This would be beneficial every way, and might occasionally serve a good turn in facilitating transmission and preventing delays in the extreme cases of magnetic storm. The advantages of the breaks and subdivisions in the route in the event of a cable failing are obvious: a portion, and not the whole, of the property is at stake. The electrical advantages are also great, for the reason I have already given, and for the facility afforded of working, transmitting, or relay stations, as circumstances may require. If all goes well,

g

if the surveys come out satisfactorily, if the bright anticipations entertained now before the expedition sails, are realised, when the results are known of the voyages of the Bulldog and the Fox, if the resolution is made to carry on the enterprise, let me press upon the promoters then to adopt in their subsequent proceedings the motto "*festina lente*,"—hasten slowly; let an excess of time be allowed for the manufacture of the cable, let there be time to spare during the shipment, let nothing be driven to the last minute,—so that if any hitch occurs, if anything goes wrong, there may be ample time to set all right without driving off the expedition to the late part of the season (applause).

Captain OMMANNEY, R.N., proposed the health of "Captain McClintock, and success to him." That gallant officer served under his command when he (Captain Ommannney) went to the Arctic regions, and he had experience of his valuable services.—Drank with great applause.

Mr. T. FALVEY :—If time permitted, Mr. Mayor, I might well dilate for a few minutes, in proposing the toast which you have placed in my hands, on the progress and prosperity of the town of Southampton. But at this late hour I should be forgetful of the comfort of this company, and unmindful of my own sense of duty, if I said one word more. We have all experience of the value and importance of those great companies which rendezvous at this port, and which are represented here to-night by two honourable and high-minded men—Captain Engledue and Captain Mangles (cheers). My toast is, "The Public Companies connected with Southampton."—The toast was drank with loud cheering.

Captain ENGLEDUÉ, J.P., responded to this toast, and expressed great gratification in partaking of doing honour to an expedition, which, in his opinion, would be productive of great results.

Mr. D. G. DOUGLAS proposed the toast of "The Press," which received a cordial welcome, and was acknowledged by Mr. H. POND.

Dr. PALK proposed "The Ladies," a toast to which full justice was done, and the proceedings of this gratifying assembly were brought to a close.

THE NORTH ATLANTIC TELEGRAPH.

VISIT OF THE QUEEN AND ROYAL FAMILY

TO

THE STEAM YACHT FOX.

PREVIOUS to the departure of the Fox on her late interesting expedition, her Majesty and the Prince Consort honoured the gallant little vessel with an inspection. In accordance with the expressed wish of his Royal Highness, on the occasion of his embarkation in the Southampton Docks on the previous Tuesday evening, the Fox was taken down to Osborne Bay, and moored off the Royal landing-place, where the visit was paid on Thursday morning, the 19th of July (1860). The Fox was dressed out in flags, the gangway and deck covered with red cloth, and every preparation made for the reception of the illustrious visitors.

At half-past ten her Majesty, the Prince Consort, and the Princesses Alice, Helena, and Louise, embarked in the Fairy, which steamed near to the Fox, when the Queen's barge was lowered and took the Royal visitors on board. The Royal party were received, on stepping on board the Fox, by the officers who formed the expedition,—viz., Captain Allen Young, the commander; Mr. J. E. Davis, second in command; Dr. Rae, commander of the land expeditions; Colonel Tal. P. Shaffner, telegrapher; Lieutenant Von Zeilau and Mr. Olafsson, the two commissioners sent out by the Danish Government; Mr. J. E. Woods, mineralogist to the expedition; and also by Mr. J. R. Croskey and Captain Magnus. Captain Young and Dr. Rae wore their Arctic medals.

Her Majesty and the Prince walked round the ship, minutely inspecting the various instruments to be used for taking soundings, &c., and the various appliances provided for the land travel and survey. The sledge used by Captain McClintock in his Franklin voyage, which was on board the Fox, was an object of special

interest to the Royal party. The Prince Consort and some of the suite went below, and examined the cabins and berths occupied by McClintock and his companions in their Arctic voyage, expressing surprise at the smallness of the apartments in which those heroic men were confined for so long a period in those desolate regions.

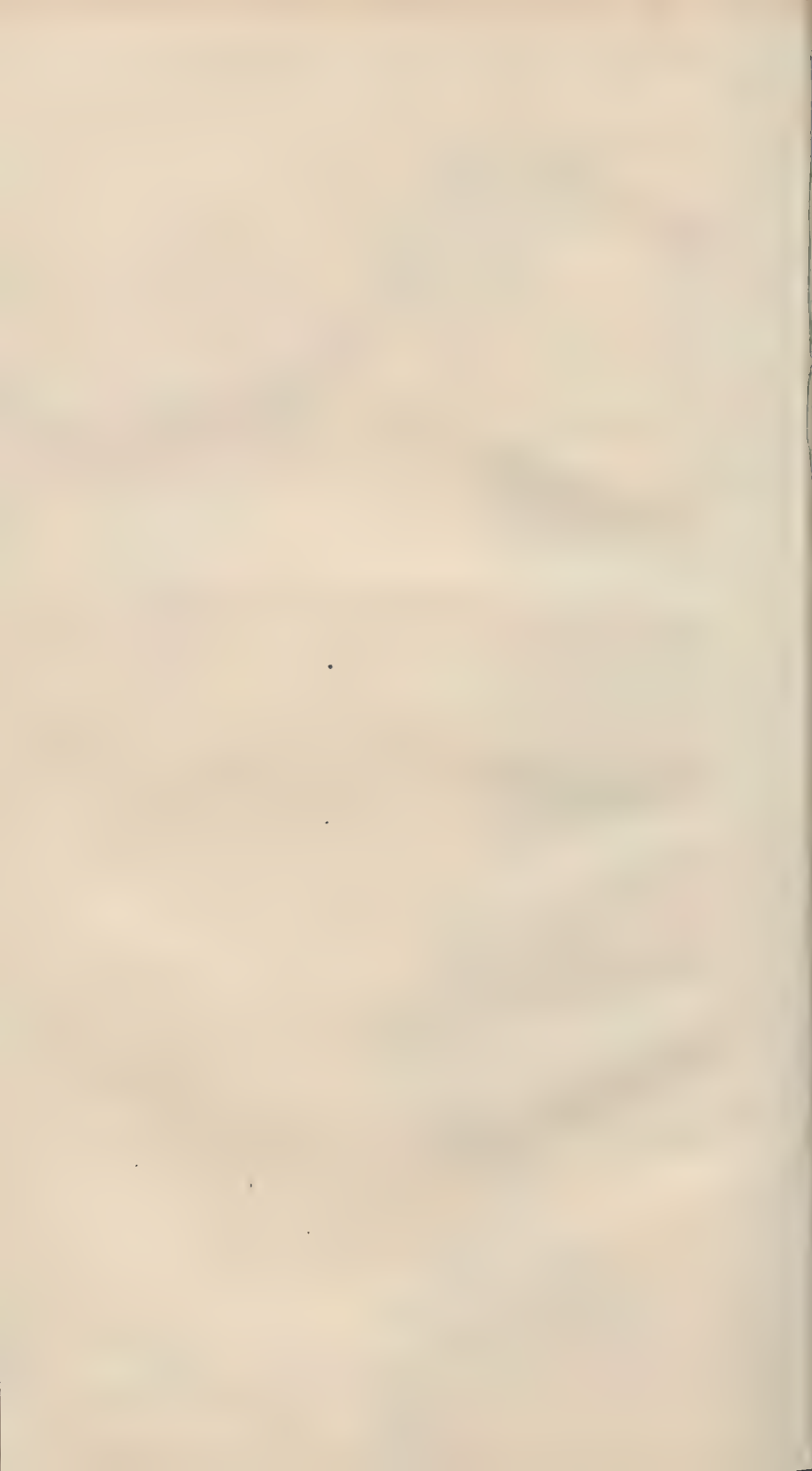
The Queen desired the officers to be presented to her individually, and her Majesty graciously addressed a few words to each of them. To Dr. Rae her Majesty said that she had heard of his important researches, and remarked that he was looking remarkably well after his laborious arctic travels. Her Majesty entered freely into conversation with Captain Young about his former voyage in the Fox, and the Franklin expedition. The Queen expressed her surprise at the smallness of the vessel for such expeditions as she had undertaken and was about to undertake; and Captain Young explained to her Majesty the mode of her construction, and the strength with which she was built, which fitted her for any service whatever.

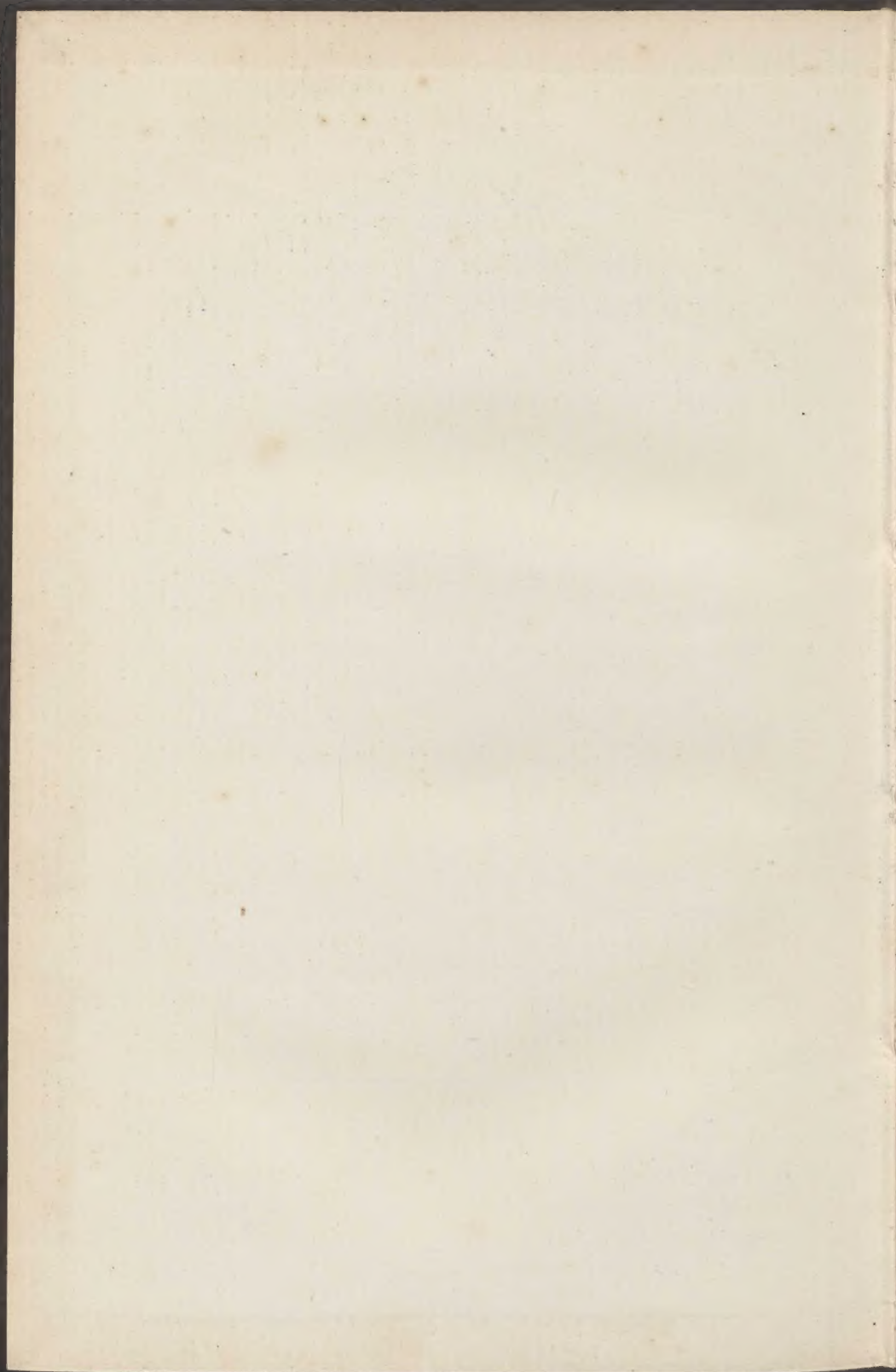
The Prince Consort expressed his admiration at the manner in which the Fox was fitted out, and inquired under whose directions and at whose expense it had been done. On Captain Young replying that it was Mr. J. R. Croskey, that gentleman was, at the request of the Prince, introduced to the Queen and himself. Mr. Croskey explained to the Royal visitors the proposed route and the general nature of the undertaking, and took occasion to thank her Majesty for the grant of the Bulldog, with which vessel it was intended the Fox should co-operate and communicate with on all possible occasions. Colonel Shaffner was also honoured with an introduction, and gave some explanations of his former voyage over the route proposed for the cable, and showed to the Royal party the action of the deep-sea sounding apparatus and other instruments to be employed in the survey. He also explained to her Majesty the advantages of the northern route for a successful telegraph line to America, and the reasons why long submarine cables could not be operated commercially. Copies of the maps and plans connected with the line were handed to her Majesty.

The Royal party remained on board the Fox about an hour, and on leaving, both her Majesty and the Prince Consort expressed their satisfaction with everything they had seen on board, and stated that they considered the project a very feasible one, and likely to be accomplished, and they wished it every success. The crew of the Fox manned the rigging, and gave three hearty cheers as the Royal party left for the Fairy.

This is a detailed historical map of the North Atlantic Ocean, specifically focusing on telegraph routes. The map is oriented with North at the top. It shows the following geographical features and labels:

- Continents and Islands:** Greenland, Iceland, the Faroe Islands, Shetland, Ireland, Scotland, England, and parts of North America (Newfoundland, Labrador).
- Water Bodies and Straits:** Davis Strait, Hudson Strait, Baffin Bay, Labrador Sea, North Sea, English Channel, and St. George's Channel.
- Telegraph Routes:** Two main routes are highlighted with solid lines. One route starts in North America (near Newfoundland), goes east through Greenland and Iceland, and then south to Europe. The other route starts in Europe (near the British Isles) and goes south towards Africa. Both routes are labeled 'ATLANTIC TELEGRAPH ROUTE'.
- Geographical Labels:** Numerous locations are labeled, including Frederikshavn, Copenhagen, Reykjavik, and various smaller islands and bays.
- Depth Soundings:** The map is covered with numerous numerical depth soundings in fathoms, indicating the ocean floor's topography.
- Coordinates:** The map includes a grid of latitude and longitude lines, with labels for degrees and minutes.





Lbs - Íslandssafn



1.

100493232 - 2

Lbs - Íslandssafn



2.

100493231 - 3

Lbs - Íslandssafn



3.

100493230 - 4

